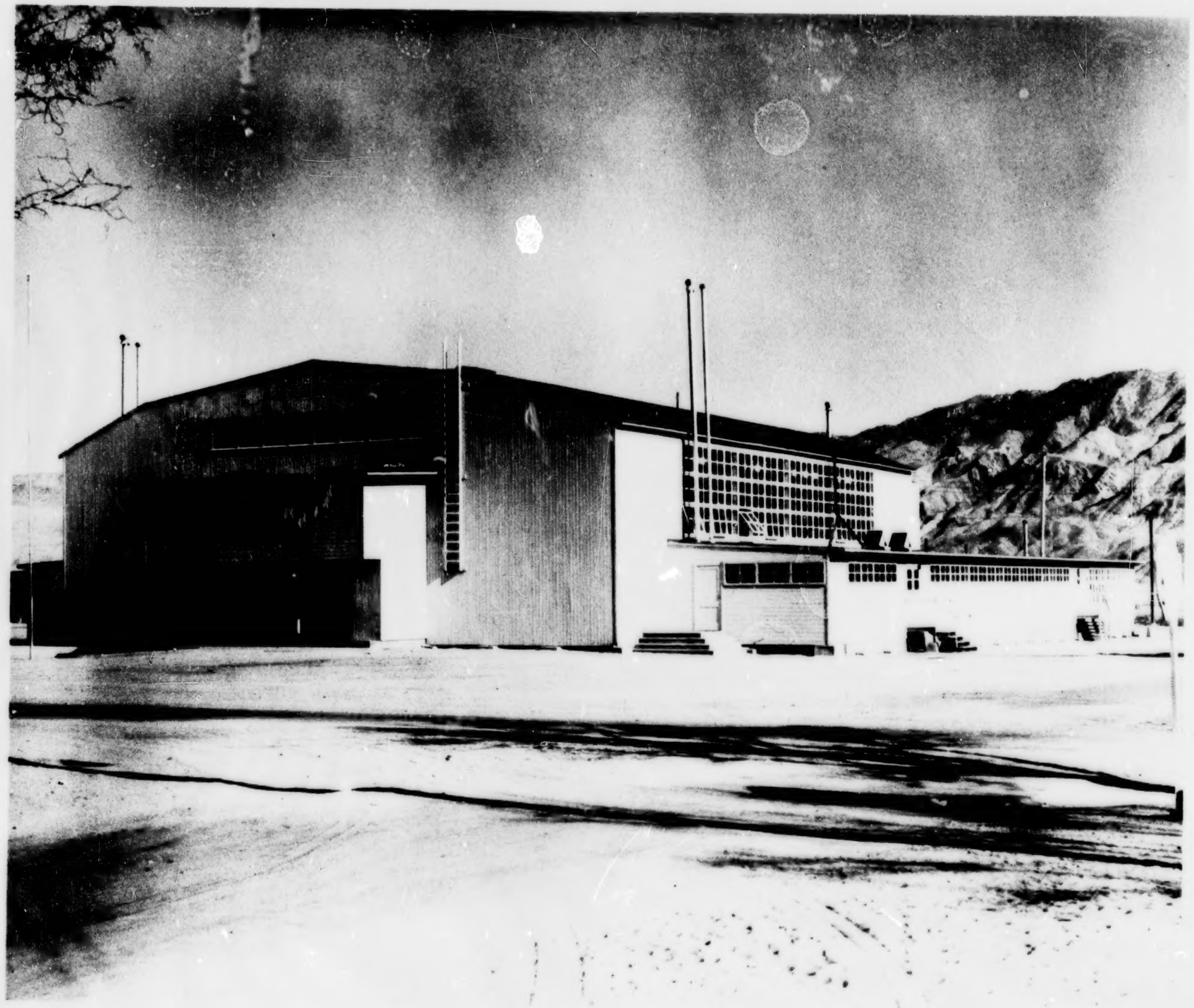

Photo 10. View toward the east from the southeast corner of the main building. At the extreme right is the northeast corner of the south wing extension which contained the health unit, which indicates that the window configuration was similar on both the north and south sides of the extension. The activity may have been a fire safety demonstration. The fire truck, at "A" Street, was one of two camp fire trucks. One of the fire trucks is now back at Manzanar, having been previously used by the City of Bishop. A second power line in the background is parallel to Highway 395. Toyo Miyatake Collection, No. 402, courtesy Archie A. Miyatake, San Gabriel, California.

Photo 11. Persons gathered at the west entrance to the auditorium are found in other photos dating this photo to April 5, 1945. The ceremony was a memorial service for Sgt. Kiyoshi Robert Nakasaki and Pfc. Sadao Munemori, who were killed in action in Italy. Because there are no flowers or shrubs in the planting beds or adjacent to the entrance walk, it is possible that other photos showing plantings were taken later in 1945. Toyo Miyatake Collection, No. 169, courtesy Archie A. Miyatake, San Gabriel, California.

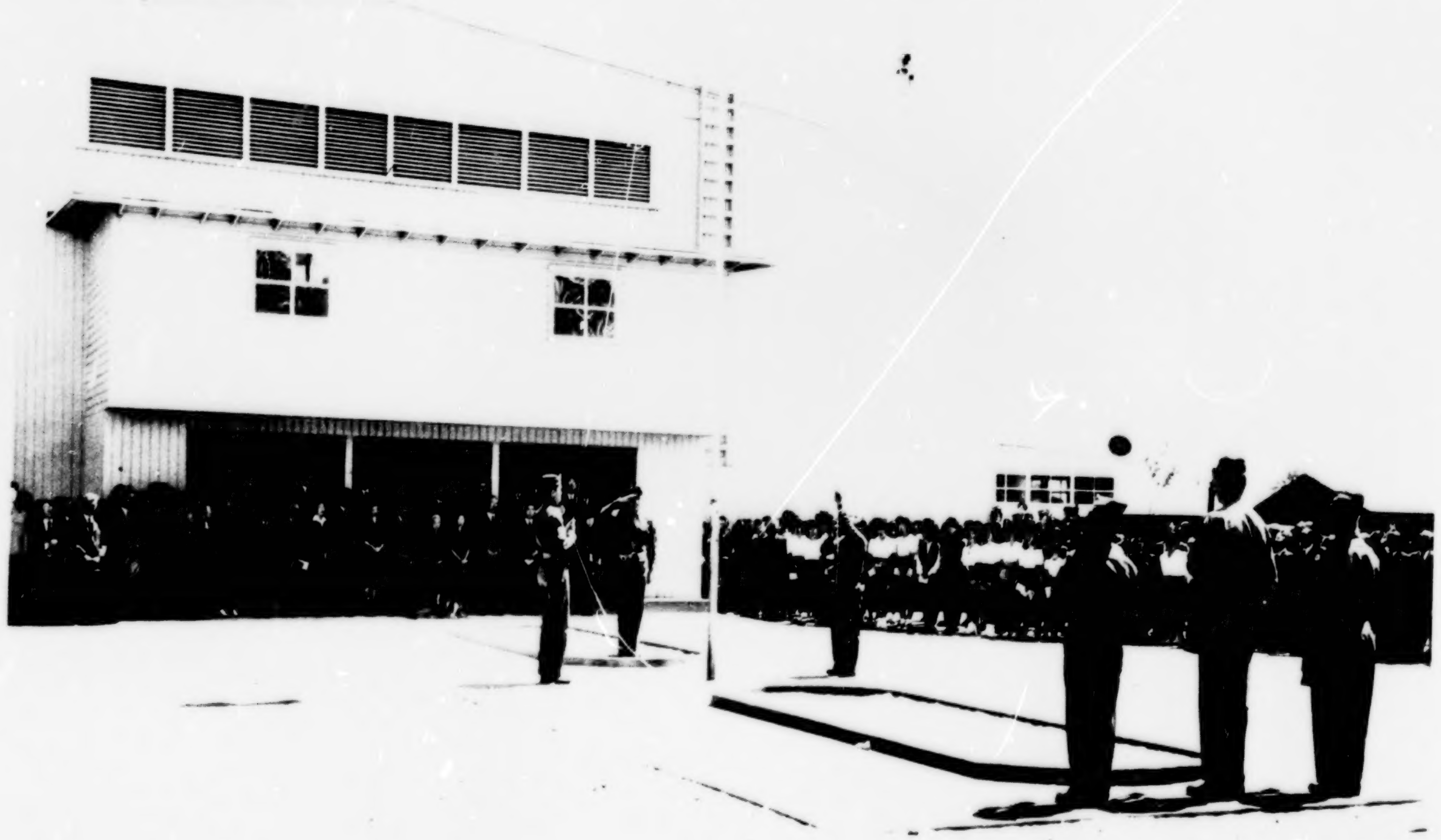

Photo 12. View, probably in 1945, toward the southwest from the west main entrance of the auditorium showing plantings along the entrance walk. The barracks in the background are in Block 8. Toyo Miyatake Collection, No. 415, courtesy Archie A. Miyatake, San Gabriel, California.

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Photo 13. Auditorium interior, probably during the first high school graduation ceremony, held in 1944. The interior work had not yet been completed. The painting was incomplete – the wall wainscot paint colors are not yet finished and the doors and trim do not have their finish colors. Also the seating appears to be all folding wooden chairs, indicating that the wooden benches had not yet been built or completed. Although the stage backdrop curtains are not visible here, which could imply they were still being made, it is possible that they are pulled upward or aside because they do not appear in some later photos. Toyo Miyatake Collection, No. 691, courtesy Archie A. Miyatake, San Gabariel, California.

Photo 14. In this view later in 1944 or possibly in 1945 of the auditorium stage, it can be seen that the painting has been completed, with medium and darker brown used on the doors and trim and for the wainscotting delineation on the walls. The northeast and southeast exit doorways are also visible and the wooden benches are in use. The ceiling light fixtures and hot air circulation units are still in place. Toyo Miyatake Collection, No. 91, courtesy Archie A. Miyatake, San Gabriel, California.

Photo 15. High School graduation ceremony in 1945. Here again is illustrated the final paint scheme. The stage backdrop curtains are shown and curtains at the north windows can be seen at the extreme left. Toyo Miyatake Collection, No. 703, courtesy Archie A. Miyatake, San Gabriel, California.

Photo 16. In the background are the three main entrance doorways in the interior west wall of the auditorium during the 1944 high school graduation showing that the walls, doors and trim had not yet been given their finish coats of paint. Toyo Miyatake Collection, No. 694, courtesy Archie A. Miyatake, San Gabriel, California.

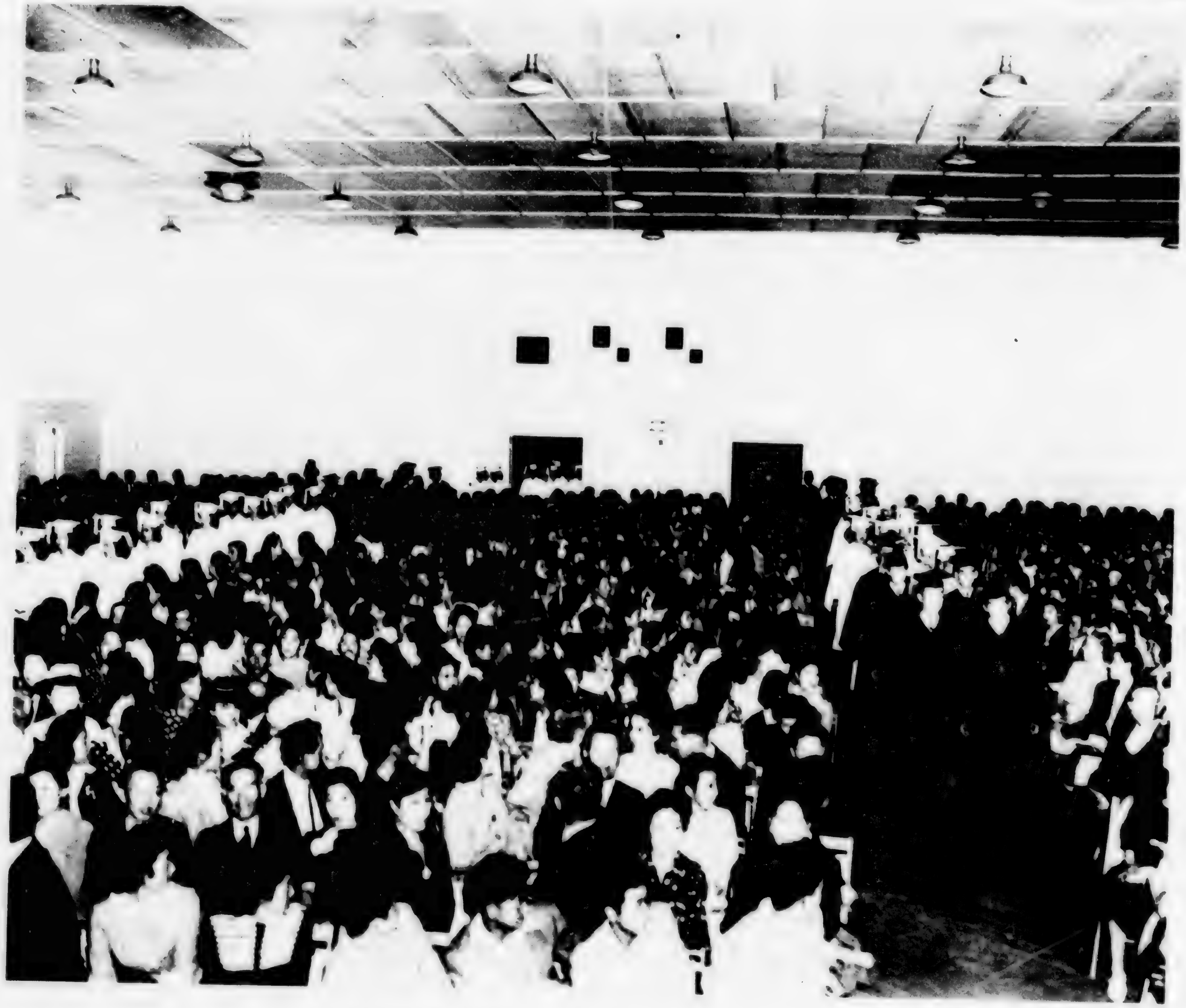

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Photo 17. The west interior wall of the auditorium during the 1945 high school graduation ceremony showing the final paint scheme. Window curtains (including black curtains for daytime movie viewings as well as evening "blackout" use) are seen as well as the wooden benches. Toyo Miyatake Collection, No. 702, courtesy Archie A. Miyatake, San Gabriel, California.

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Photo 18. This view toward the southwest corner of the auditorium also provides a close-up view of the wooden benches. 1944 or 1945. The window curtains had not been installed at this time. Fire extinquishers are seen on two of the columns of the south wall. The hangers or evidence of their locations are extant. Toyo Miyatake Collection. No. 171-i(L), courtesy Archie A. Miyatake, San Gabriel, California.

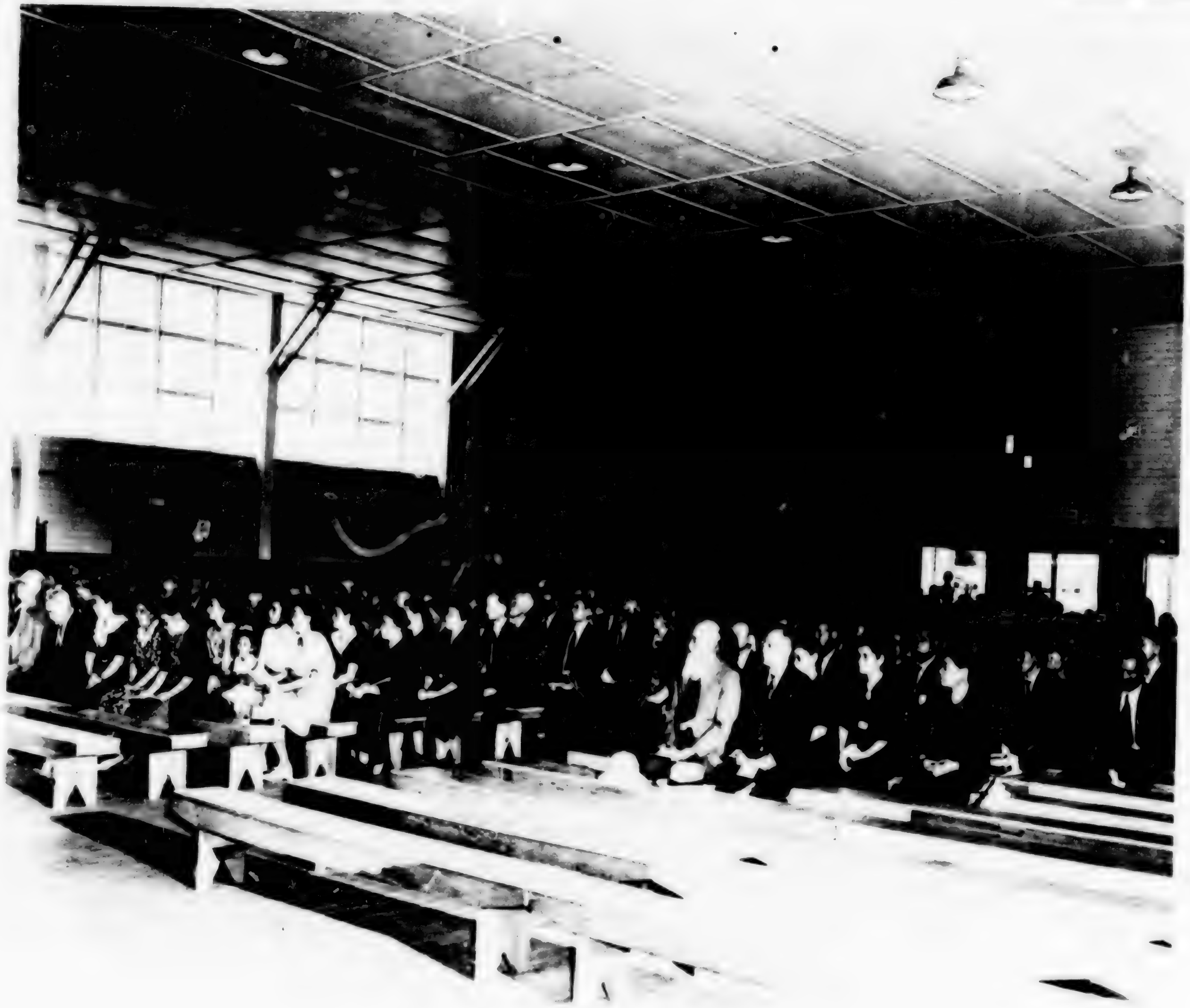

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Photo 19. West wall and northwest corner of auditorium, probably in 1945. The window and black-out curtains are seen at the north windows A long pole in the northwest corner may have been for operating the windows. Only every other sash unit of the lowest row were operable. Toyo Miyatake Collection. No. 286, courtesy Archie A. Miyatake, San Gabriel, California.

Photo 20. West main entrance of auditorium, April 5, 1945. Photo taken during the memorial service for Sgt. Kiyoshi Robert Nakasaki and Pfc. Sadao Munemori. The entry portico was divided by two simple posts. At the left (north) side the ticket booth door and window are visible, both of which are still extant. Toyo Miyatake Collection, No. 170-B, courtesy Archie A. Miyatake, San Gabriel, California. This photo is also in the Eastern California Museum Collection, Brown Album.

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Photo 21. Another view at the west main entrance during the April 5, 1945 memorial service showing details at the doorways. The three double entry door sets and the closers are no longer in place but the light sockets are extant. Toyo Miyatake Collection, No. 170-A, courtesy Archie A. Miyatake, San Gabriel, California.

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Photo 22. South wall of auditorium interior. This view toward the southwest corner shows in clear detail the windows, a fire extinguisher at the far column, bolting of the built-up columns and the painting scheme. The window curtains however are not yet in place. 1944 or 1945. Toyo Miyatake Collection, No. 614, courtesy Archie A. Miyatake, San Gabriel, California.

Photo 23. Auditorium interior south wall, view toward southeast corner. 1944 or 1945 Toyo Miyatake Collection, No. 541, courtesy Archie A. Miyatake, San Gabriel, California.

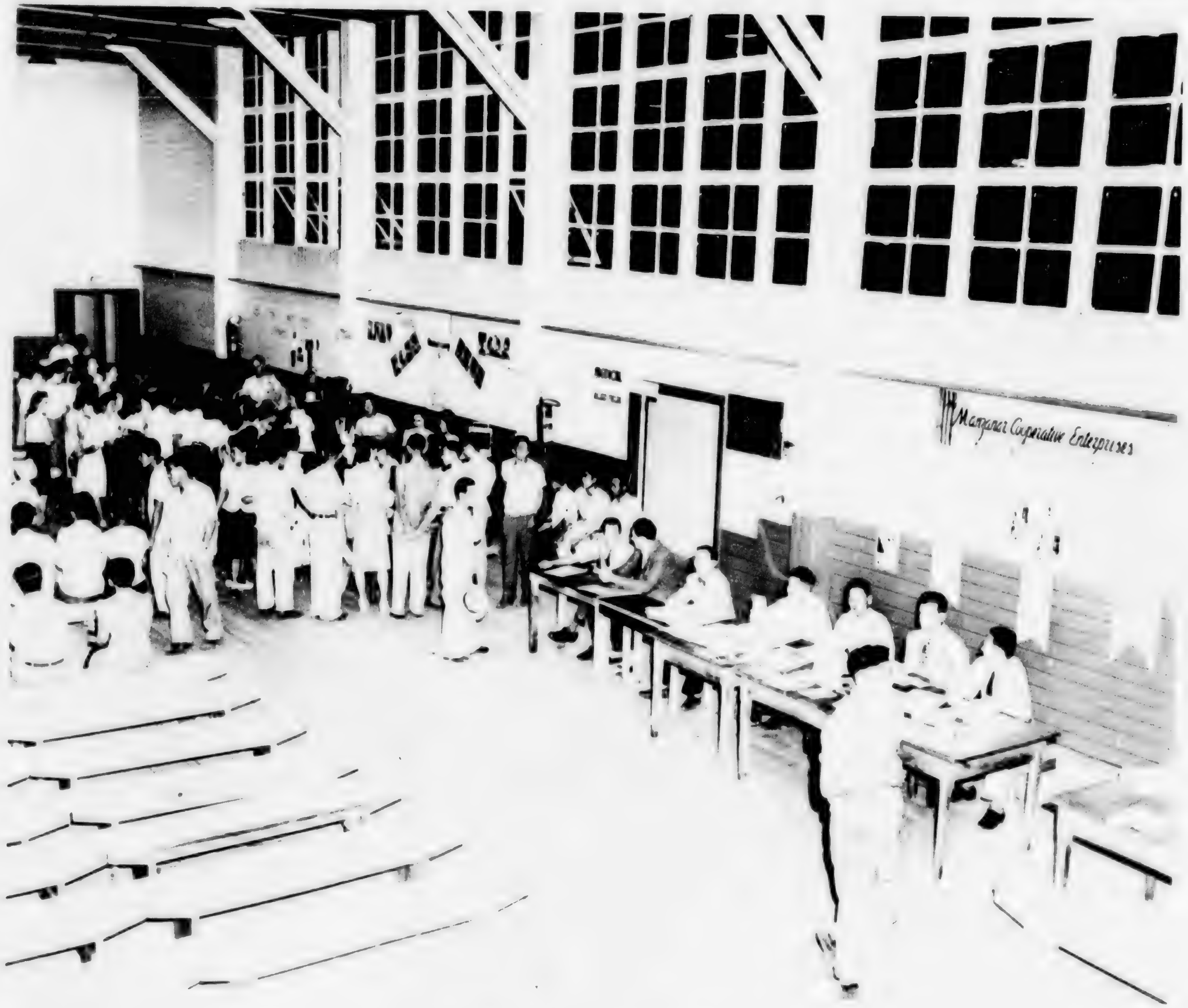
Manzanar Cooperative Enterprises

Photo 24. Northwest corner and north wall of auditorium interior. 1944 or 1945. Toyo Miyatake Collection, No. 189, courtesy Archie A. Miyatake, San Gabriel, California.

Photo 25. Auditorium interior, northeast corner and front of stage, 1944 or 1945. Toyo Miyatake Collection, No. 191, courtesy Archie A. Miyatake, San Gabriel, California.

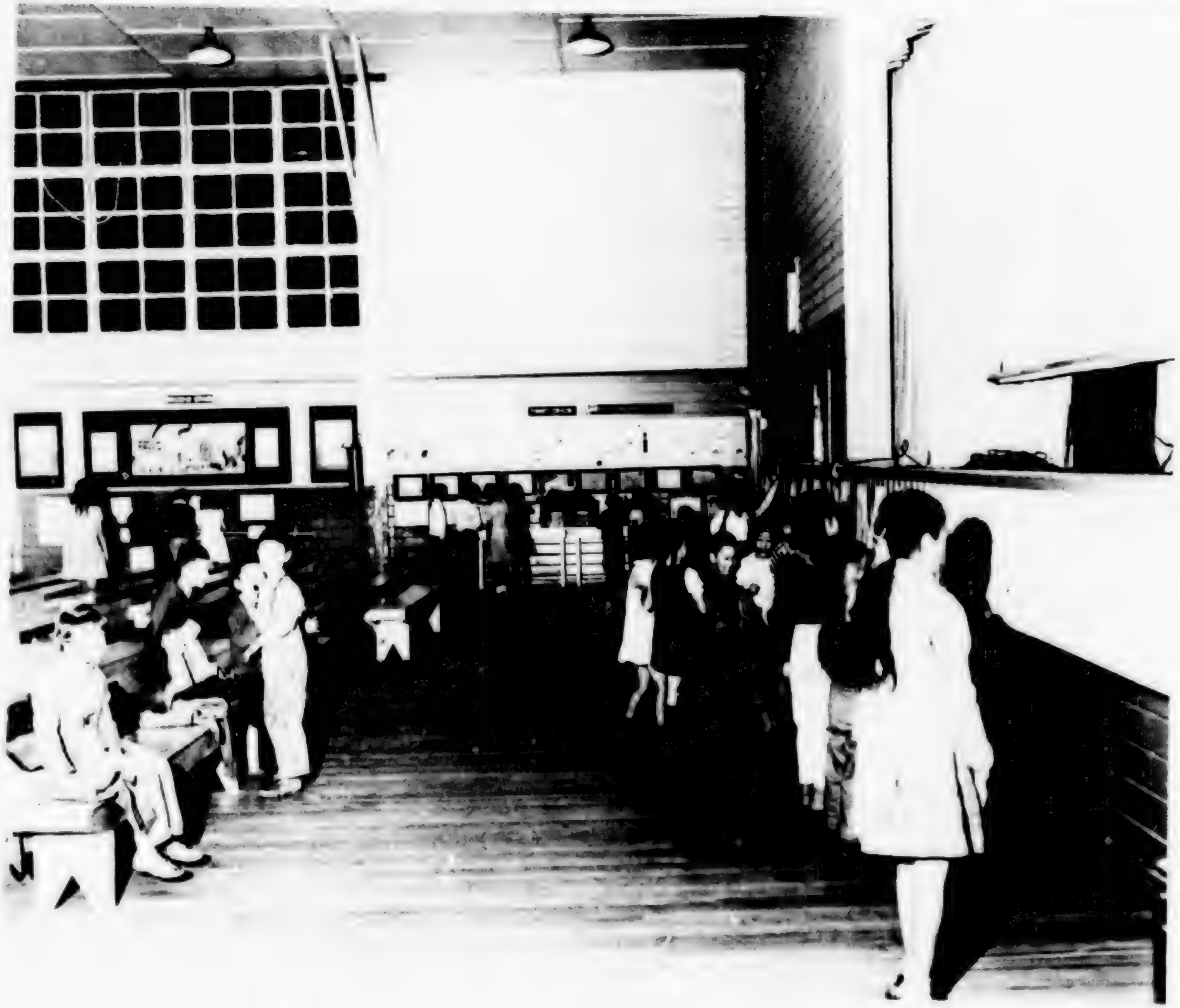

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Photo 26. Southeast corner of auditorium interior, 1944 or 1945. For some activities, the stage became temporary storage for the benches. Toyo Miyatake Collection, No. 817, courtesy Archie A. Miyatake, San Gabriel, California.

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Photo 27. Manzanar Project Director Ralph P. Merritt delivering eulogy during memorial service for Pfc. Arikawa, first evacuee from Manzanar to be killed in action while serving in the U.S. Army. August 6, 1944. The stage curtains may have been taken down for resumption of painting. The door had not yet been installed in the opening in the upper left corner of the stage space. The doorway was to an unfinished room at the north side of the stage space. There is a similar space at the south side. There is no evidence of either stair or ladder access to either space. Toyo Miyatake Collection, No. 171-D, courtesy Archie A. Miyatake, San Gabriel, California.

Photo 28. Another view of the north side of the stage. At this time, possibly late 1944, the door had been installed at the upper stage level, additional painting completed and some stage curtains rehung. Toyo Miyatake Collection, No. 708-B, courtesy Archie A. Miyatake, San Gabriel, California.

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Photo 29. View of stage, possibly late 1944, after the doors leading off-stage had been installed and probably most of the painting completed. The stage curtains that had been installed earlier have probably been taken down for the painting work. Toyo Miyatake Collection, No. 843, courtesy Archie A. Miyatake, San Gabriel, California

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Photo 30. Close-up view of stage taken during the 1944 high school graduation ceremony. This shows the overhang at the front of the stage. This view again illustrates that the painting was incomplete at this time. Toyo Miyatake Collection. No. 686, courtesy Archie A. Miyatake, San Gabriel, California.

Photo 31. Another view of the stage during the 1944 high school graduation. A small window-like opening is seen at the south side of the stage, and adjacent to it a smaller opening for an electrical panel. At the far right is one of a pair of openings and speaker(duplicated at the opposite side of the stage) of the public address system. Toyo Miyatake Collection, No. 700, courtesy Archie A. Miyatake, San Gabriel, California.

Photo 32. The stage during the 1945 high school graduation. Note the full array of stage curtains. The footlight trough is more visible in this view. Toyo Miyatake Collection, No. 687-C, courtesy Archie A. Miyatake, San Gabriel, California

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Photo 33. This close-up taken during the 1945 high school graduation provides more detail of the footlighting. Toyo Miyatake Collection. No 687-D, courtesy Archie A. Miyatake, San Gabriel, California.

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Another building of this group, typical in every detail except for size, was 24 ft. x 100 ft. with an adjoining open shed for storage 60 ft. x 100 ft. This shed had 8-foot walls open on one side, and covered on one side and one end with 10-inch drop siding. Two-by-six rafters, spaced on 4-foot centers were sheeted with 1-inch random-width sheeting and roofed with roll roofing. A wood floor of 1 in. x 6 in. sheeting was used in this addition.

A cutting shed, 150 ft. x 24 ft. 6 in., was used in conjunction with the net garnishing or camouflage buildings. All the materials necessary for the construction or fabrication of the nets were processed within this building.

It was constructed of 2 in. x 4 in. floor joists with 1 in. x 6 in. shiplap flooring, 2 in. x 6 in. studding 8 feet long, spaced on 4-foot centers, 2 in. x 8 in. knee braces with every forth set of rafters. The rafters were 2 in. x 6 in., spaced 3 ft. 4 in. on centers. One side was left open while the other side was sheeted from the floor to the plate line with 10-inch drop siding. Both ends were sheeted from the floor to the ridge with the same material.

All necessary tables, benches, drum reels, and storage cabinets were installed.

3 Oil-storage Tanks and Platforms (Contractors: Griffith and Company, Los Angeles, California)

There were 37 oil-storage tanks and platforms constructed, one in each block and one at the Military Post. They were constructed for the storage of fuel oil for distribution through pipe lines to the hot-water heaters (and later the ranges) in the mess halls, to the hot-water boilers in the boiler rooms attached to the latrines, and to the boiler in the rooms attached to the laundries. Fuel oil was also stored in these tanks for daily distribution to the evacuees to be used in the spare heaters in their barracks.

The storage-tank platforms rested on 12-in. x 12 in. concrete piers projecting approximately 12 inches above the natural grade, and of sufficient depth to insure a solid footing. Four posts, 6 in. x 6 in. x 5 ft., spaced 7 feet on centers with a 6 in. x 6 in. cap projecting 2 feet beyond the posts, formed the bents for a deck or floor of 3 in. x 10 in. x 12 ft. Douglas fir. A gable roof, covered with roll roofing, was used. This roof was open on the gables and was supported by 2 posts, 4 in. x 4 in. x 5 ft., at each corner with 3 intermediate studs of 2 in. x 4 in. material. Plates, 2 in. x 4 in., and ties were used for support and for bracing the roof. The under-structure was braced horizontally and diagonally with 2 in. x 6 in. material.

There were 12 cylindrical galvanized iron tanks which had a capacity of 2,450 gallons each, and 25 tanks which had a capacity of 1,250 gallons each.

There were two 6,000 gallon reinforced concrete tanks at the hospital boiler house used for the storage of fuel oil for the hospital boilers. These tanks were buried below grade.

4 Observation or Watch Tower (Contractor: Charles I. Summer, Lone Pine, California)

There were eight towers supported on 24 in. x 24 in. concrete piers embedded in the ground a sufficient depth to insure a sound footing sufficient to take care of the weight and wind load. Each pier had anchor straps for the securing of the 6 in. x 6 in. corner posts. These towers were 8 feet square at the base and 6 feet square at the top. The corner posts, 6 in. x 6 in., were of Douglas fir. There were two platforms on each tower. The lower one, 6 ft. x 10 ft., was enclosed with 2 in. x 6 in. joists and 2 in. x 6 in. flooring with 1 in. x 8 in. shiplap and two sash windows, 2 ft. x 3 ft. 6 in., were installed on each side. The upper platform was 8 ft. x 12 ft. with 2 in. x 8 in. girders, 2 in. x 6 in. joists, and 2 in. x 6 in. flooring. A railing of 2 in. x 4 in., with 2 in. x 4 in., posts encircled this platform. A 2,000 candle power searchlight was mounted on each tower. All towers were securely braced, both horizontally and diagonally.

5 Fencing (Contractor: C.J. Paradis, Los Angeles, California)

The fencing project consisted of the removal of 5,000 lineal feet of old fencing and the installation of 18,871 lineal feet of new fence of 5-strand barbed wire around the boundaries of the Center area.

IV LAND IMPROVEMENT

(Contractor: C.J. Paradis, Los Angeles, California)

Land improvements were of a temporary nature. Streets, alleys, and building sites were graded off to allow for the passage of motor vehicles, and then given a light coat of penetrating oil. No primary grading of the streets or drainage structures was done by this firm.

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CHAPTER 2

WRA CONSTRUCTION

I NEW CONSTRUCTION

All construction and remodeling performed by WRA was under a force account system. No contractors were used for any phase of this work.

A Staff Housing

Nineteen buildings were erected to house the appointed personnel; 14 were of the 4-family unit type, 3 were dormitories, and 1 was a central laundry. Of these 19 buildings, 18 were erected south and adjacent to the administrative group. Another building of the 4-family unit type was built near the hospital group and was used for the housing of the Chief Medical Officer and the appointive nurses.

The 4-family unit-type staff building were 20 ft. x 94 ft., supported on three rows of concrete piers spaced 10 feet on centers the full length of the building. Girders of 6 in. x 10 in. Douglas fir, built up from 2 in. x 10 in. timbers, supported 2 in. x 6 in. floor joists spaced 24 inches on centers. All walls and partitions were framed from 2 in. x 4 in. Douglas fir excepting the dividing partitions between the apartments. These were made with 2 in. x 8 in. plates, top and bottom, with staggered 2 in. x 4 in. studding spaced 24 inches on centers. This double partition was sound-deadened with Kimsul insulating felt; it also enclosed all the water pipes for the adjoining baths and kitchens.

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The rafters were 2 in. x 4 in. spaced 48 inches on centers with a 1 in. x 6 in. placed flat and midway between each set of rafters. The 1 in. x 6 in. redwood sheeting was securely nailed to the rafters and to the 1 in. x 6 in. which acted as a stiffener for the roof. Roofing was the split-sheet type, each sheet overlapping the preceding sheet by more than half the width of the roll giving a double thickness to the whole roof.

The exterior was covered with 1 in. x 6 in. V shiplap. A 1 in. x 3 in. sloping water table was placed around the building 4 inches below the finished floor line, and the space below this point was boxed in with 1 in. x 6 in. redwood sheeting, forming a tight base to keep out cold, trash, animals, and the like.

All floors were single thickness 1 in. x 4 in. tongue-and-groove Douglas fir. Each building contained two 2-bedroom apartments with a living room, kitchen, and bath in each apartment, and two 1-bedroom apartments including a living-room, kitchen, and bath in each.

The interiors of these buildings were lined with 3/8-inch plaster board; awning-type windows were used throughout. Cabinets were built and installed in each kitchen.

The three dormitories were the same in [redacted] 24 ft. x 140 ft. in size. Each building contained 10 double- and 3 single-bedrooms, 2 shower rooms, 2 toilets, 1 bathroom, 1 linen room, and 1 furnace room which was also used as a utility room and was equipped with 2 double-compartment cement wash trays and a hot-water boiler.

The rafters were 2 in. x 4 in. spaced 48 inches on centers with a 1 in. x 6 in. placed flat and midway between each set of rafters. The 1 in. x 6 in. redwood sheeting was securely nailed to the rafters and to the 1 in. x 6 in. which acted as a stiffener for the roof. Roofing was the split-sheet type, each sheet overlapping the preceding sheet by more than half the width of the roll giving a double thickness to the whole roof.

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The three dormitories were the same in type [redacted] 24 ft. x 140 ft. in size. Each building contained 10 double-and 3 single-bedrooms, 2 shower rooms, 2 toilets, 1 bathroom, 1 linen room, and 1 furnace room which was also used as a utility room and was equipped with 2 double-compartment cement wash trays and a hot-water boiler.

All of these buildings were supplied with 120- and 220-volt electrical current, the former for lighting and the latter for cooking. All installations were made according to approved plans.

Plumbing was installed and sewer connections were made, also, according to approved plans.

All buildings were painted two coats on the exterior wall, interior trim , and floors. The ceilings and interior walls were painted with cold-water paint or kalsomine.

B Gymnasium-Auditorium

The gymnasium-auditorium, which was used for various Center activities, was the only building constructed in the school group. All construction of the other units for the schools was canceled by the WRA and the school buildings that were used were provided by remodeling existing barrack-type buildings.

The gymnasium-auditorium structure classified as gymnasium type A, had an overall width of 118 ft. and a length of 119 ft. The main auditorium floor was 80 x 96 feet square. The stage at the east end of the main floor was 22 feet deep with an overall width of 30 feet.

On each side and adjacent to the stage, a dressing-room provided space for equipment and stage trappings.

A wooden truss, supported on each end by wooden columns, supported the proscenium arch which had a clearance of 12 feet from the finished floor.

Extending the full length of the main section. and. on each side, a one-story shed-type section was constructed. This portion housed the toilets, dressing-rooms, lockers, and offices. The one-story shed-type section on the south side extended 40 ft. 9 in. beyond the east end and was used as a health unit.

The auditorium-gymnasium was built on piers placed approximately 8 feet on centers each way. Girders were of 6 in. x 10 in. material with 2 in. x 6 in. floor joists, spaced 12 inches on centers. All floors were double; the first or subfloor was of 1 in. x 6 in. Douglas fir shiplap laid diagonally, while the finished floor was 1 in. x 4 in. tongue-and-grooved Douglas fir, sanded and varnished.

The walls of the main section were 20 feet high. Posts, 12 in. x 12 in., supported five Pratt-type wooden trusses. These trusses were constructed with split ring connecters and bolts. The ceiling joists were of 2 in. x 6 in. material. Roof purlins were 2 in. x 10 in. lap jointed at each end and solid at each lap.

Diagonal sheeting was laid over the purlins, and then split-sheet roofing was applied, mopped on with hot asphalt.

A shed-type roof was build over the stage; 2 in. x 12 in. joists spaced on 24-inch centers with 2 rows of solid bridging were used on this section. Sheeting of 1 in. x 6 in. shiplap was laid and split-sheet roofing was mopped on.

A concrete porch, 9 [illegible] across the front for an entrance to the three sets of double doors. Above this porch the moving picture projection booth, 8 ft. 6 in. x 30 ft. 11 in., was housed. This was divided into two rooms; one for the machines and the other for the rewinding of the films. The entire area of both rooms was lined with fireproof asbestos board.

Two inside stairways leading from the main floor to this booth furnished access and a means of escape in case of fire.

The one-story shed section, housing the toilets, dressing-rooms, locker rooms, and health room, was constructed with 2 in. x 4 in. studding, with 2 in. x 12 in. rafters spaced 24 inches on centers, and bridged with solid blocking, sheeted and roofed, the same as for the other portions of the building.

The exterior wall finish was 1 in. x 6 in. V shiplap painted to protect it from the weather. The interior wall finish was of the same material. The auditorium ceiling was finished with 1/2-inch fibre board applied to the ceiling joists flush with the underside of the bottom cords of the trusses. All ceilings in the remaining portion of the building were of the same material.

Heating was provided by H.C. Little forced draft automatic oil heaters. These heaters were placed in the most strategic points. Two were under the stage and forced the heat directly into the main auditorium through screened grills. Two others were placed at the front, in the room adjacent to the main floor, and supplied heat in main room. Two others were connected to overhead ducts and forced the hot air through the grills into the toilets, shower rooms, and offices. The dressing-rooms and healthunit were provided with independent space heaters.

The hot-water system consisted of a 250-gallon Hanson boiler located under the stage and connected with necessary piping running

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from this point to the health unit, showers, wash rooms, and toilets

Electric wiring was installed for the proper illumination and operation of all equipment including four Trane 15 P. projector fans installed in the ceiling of the auditorium. Special footlights and overhead lighting were provided for the stage.

Plumbing and sewage were installed according to plans with the necessary connections made to the sewer and water mains.

C Poultry Farm

A group of 15 buidlings were construcetd for the poultry farm south and west of the Center, adjacent to the fence surrounding the Center as shown in Appendix 1, Figure 1. In this group were the following structures:

Type	Number
Warehouses connected at one end	2
Brooder houses	8
Laying houses	6
Total	16

The warehouse and office building was of U-type construction with an overall area of 3,800 sq. ft. (70 ft. x 80 ft.). The warehouse or feed storage space was in the two wings, each wing being 20 ft. x 60 ft. with a total floor area of 2,400 sq. ft. The office and egg-storage rooms were each 16 ft. x 20 ft., and the dressing and packing room which connected the two wings was 20 x 30 ft.

The building was built with a continuous concrete footing which projected 6 inches above the finished floor line. All floors were of concrete, troweled to a smooth finish. The walls were constructed of 2 in. x 4 in. studding plates. The studding was cut 7 feet long and spaced 2 feet on centers. The walls were completed by 1 in. x 6 in. sheeting covered with 15-lb. building paper held in place with 3/8 in. x 2 in. batts.

The rafters were of 2 in. x 6 in. material with 2 in. x 4 in. cross ties and bracing spaced 3 feet on centers, covered with 1 in. x 6 in. redwood sheeting and split-sheet roll roofing. The windows were 4 ft. x 2 ft. 4 in. frameless, awning type.

A butane-fired scalding kettle, used for the dressing of poultry, was installed in the dressing and picking room.

There were eight brooder houses, 14 ft. x 24 ft., divided into two equal-sized rooms, each being large enough for the brooding of 500 baby chicks. The floors and foundations were concrete with the foundation walls projecting 6 inches above the finished floor as a protection against flooding from the storm waters. The studding was of 2 in. x 4 in. material, spaced 2 feet on centers, cut 6 ft. 6 in. for the back wall and 7 ft. 6 in. for the front wall, making a shed-type roof. The rafters were 2 in. x 4 in. material, spaced on 4 feet centers with 2 in. x 4 in. supports running at right angles to the rafters. Roof sheeting was 1 in. x 6 in. redwood covered with split-sheet roll roofing.

The walls were sheeted with 1 in. x 6 in. shiplap, painted to protect it from the weather. The windows were the frameless awning type. Kerosene-burning brooders were used, and were vented through the roof with 6-inch galvanized piping. Outside runs constructed of chicken netting and wood posts were constructed the full length of each building. These runs were 16 feet wide and were divided in the center with fencing of the same type.

There were six laying houses, 20 ft. x 192 ft., divided into eight units per buidling. Each unit had an area of 20 ft. x 24 ft., large enough for the housing of 175 hens. The floors and foundations were of concrete, the foundation projecting 6 inches above the finished floor.

The walls were framed from 2 in. x 4 in. material, cut 7 feet long and spaced 2 feet on centers with 2 in. x 4 in. plates, top and bottom. The siding was 1 in. x 6 in. shiplap while the roof was framed with 2 in. x 4 in. rafters and 2 in. x 4 in. cords, each set braced to form a truss. They were spaced 4 feet on centers and sheeted with 1 in. x 6 in. redwood. Split-sheet roll roofing was used. The dividing partitions between each unit was 1 in. x 6 in. shiplap with 2 in. x 4 in. studding. Each section was provided with a 2 ft. x 2 ft. roof vent equipped with a trap door for the regulation of heat and air. Sufficient roosts and laying boxes were installed to adequately care for the maximum number of hens housed in each section. The exteriors of all buildings were painted to protect them from the weather.

Outside runs, 20 ft. x 24 ft., of 2-inch mesh chicken wire and wood posts were constructed for each section or compartment. Wood feeding troughs were built and used for the feeding of mash and other feed.

All buildings of this group, including the warehouses, laying pens, and brooder houses, were provided with running water, piped in from the center mains and lighted by electricity from the connections to the lines within the Center.

D Root Cellar

The root cellar was constructed for the storage of root vegetables grown on the Project farms. An excavation was made 6 feet in depth and sufficient in size to receive the building. The dimensions of this building was 26 ft. x 100 ft. A continuous footing of concrete was poured across the ends down both sides. Two footings running lengthwise and spaced 10 feet in from the outside line of the building were also put in. A 2 in. x 6 in. mud sill was bolted to the outside footings and 2 in. x 6 in. studding 8 feet long, spaced 18 inches on centers with a double 2 in. x 6 in. plate, were installed.

Extending through the interior of the building and resting on the interior footings, a 2 in. x 6 in. plate was laid. From this plate, and extending to 6 in. x 6 in. girders that supported the rafters, 4 in. x 6 in. posts were placed spaced 10 feet on centers and securely braced with knee braces to the 6 in. x 6 in. plates. Two rows of these posts, 3 feet from the center line of the building, acted as supports for the rafters.

Rafters of 2 in. x 6 in. Douglas fir with [illegible] in. x 6 in. Douglas fir cords, bolted to the [redacted] on centers. Roof sheeting was of 1-in. Douglas fir securely nailed. The roof was 90-lb. mineral-surfaced felt roofing.

A center runway, 6 feet wide, extended the full length of the building and was flanked on both sides with storage bins. These bins were equipped with 1 in. x 6 in. wood floors with 1-in. spacing between the boards which rested on 2 in. x 6 in. floor joists spaced on 24-inch centers raised sufficiently from the ground to allow free circulation of air. There were 10 bins installed on each side of the runway, partitioned off with 1 in. x 6 in. boards with a 1-inch space between each.

Installed over each bin were air vents, which were 2 feet square and extended 2 feet above the finished roof. They were equipped with manually operated dampers.

The inside of the exterior wall was covered with 1 in. x 6 in. boards from floor to plate line, spaced 1 in. apart.

The outside of the exterior walls was covered with 1-inch random sheeting from the top plate line half way to the mud sill. From this point on, an air vent extended from the front of the building down both sides and connected with a 3 ft. x 3 ft. tunnel vent located in the center of the rear end. The air vent around the building was built by placing 2 in. x 4 in. supports out on a 45-degree angle and attached to the studding at a point corresponding to the exterior wall sheathing. These air-vent rafters or supports were covered with heavy building paper to prevent moisture from entering the building.

A double refrigerator-type door, 6 ft. x 8 ft., was installed in one end.

A dirt ramp was graded off from regular grade to the building entrance which provided easy loading and unloading facilities for produce delivered to and from the building. An electric line was run into the building to provide lighting for the handling of produce stored there.

The construction was completed by back filling around the walls and covering the roof with a layer of straw topped off with 8 inches of clay.

E Hog Farm

The hog project was located 2,600 feet from the southwest corner of the Center.

The feed storage building was 20 ft. x 80 ft. with the floor and footings of concrete. The footings projected 6 inches above the finished floor. This was necessary to keep flood waters from entering the building and damaging the stored feed. The walls were 8 feet in height, framed with 2 in. x 6 in. studs and plates. The studdings were placed 4 feet on centers with one 2 in. x 6 in. horizontal nailing girt spaced half the distance between the top and bottom plates. Double doors, 6 ft. x 8 ft., were placed in each end. The siding was 1 in. x 8 in. D.F. sheeting covered with 15-lb. building felt held in place by 3/8 in. x 2 in. batts.

The rafters were 2 in. x 4 in. Douglas fir spaced 4 feet on centers. Each set was trussed with 2 in. x 4 in. cords and braced with knee braces on each third set. The roof was sheathed with 1 in. x 12. Douglas fir and covered with 90-lb. mineral-surfaced roofing.

The farrowing pens and houses were built as a unit. They were sheds 4 feet high on the back and 6 feet high on the front. Studs, 2 in. x 4 in., were used with 1 in. x 6 in. sheeting. The roof was covered with 45-lb. roll roofing. Each house was divided into six pens or sections 8 ft. by 5 ft. each with doors both front and rear connecting to outside pens. These pens on one side were provided with cement floors for feeding. A concrete gutter or trough, 12 inches wide and 4 inches deep, extended the full length of the feeding platforms. This was used as a catch trough for non-edible material.

There were three hog houses, 20 feet square, with a partition in each building equally dividing the floor space. These houses were constructed from rough 1-inch material with 2 in. x 4 in. posts. They had shed-type roofs, 4 feet high on the low side and 6 feet high on the high side. Each house was surrounded by board panel fencing. Of this fencing 2,070 lineal feet was constructed, using 250 posts, 4 in x 4 in. x 6 ft. and 8,280 lineal feet of rough 1 in. x 6 in. material was used in thepaneling. Additional pens were built in which 864 lineal feet of 30-inch hog-fencing and 108 4 in. x 4 in. x 8 ft. posts were used. For feeding, 4,310 sq. ft. of concrete platform or decking was constructed.

Water was piped from George's Creek to concrete watering throughs installed in each pen. Electricity for lighting was previded by extending the lines from the center to the farm.

F Industrial Latrines

Two latrines were constructed in the warehouse section of the industrial area where their construction was justified by the number of people employed in this section. They were 16 ft. x 24 ft. with a center partition separating the men's section from the women's.

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The foundations and floors were of concrete. Studdings, 2 in. x 4 in. x 8 ft. and spaced 2 feet on centers, were covered with 1-inch sheathing and building paper held in place by 3/8 in. x 2 in. batts.

The roof was framed from 2 in. x 4 in. material. The rafters were placed on 3-foot centers, sheathed with 1-inch material, and roofed with split-sheet roll roofing. Windows were of the frameless awning type, size 4 ft. x 2 ft. 4 in., while the doors were made from the material on hand. The women's section was equipped with five toilets, a wash basin, and a floor drain. The men's section was equipped with three toilets, two urinals, a wash basin, and a floor drain.

Cold water was supplied by tapping the main water line but no hot water facilities were provided. A small oil-burning space heater was installed in each room as a protection against freezing during periods of extreme cold.

G New Garage

A garage building was constructed in the motor pool area 60 feet west of the old garage. The construction was justified by an acute shortage of space for the repair and maintenance of automotive equipment.

The garage had a frontage of 48 feet and a depth of 30 feet, outside dimensions, with concrete floors, footings, and a 6-inch concrete curb to keep storm waters from flooding the floors. It was divided into three stalls of equal size--one stall for lubrication, one for washing, and the other for painting.

The walls were 12 feet high, framed from 2 in. x 6 in. lumber, spaced 2 feet on centers and covered with 1 in. x 6 in. V shiplap. The roof was constructed by placing double 2 in. x 6 in. rafters or plates over the outside walls and 2 center partitions. Studding, 2 in. x 6 in., placed 2 feet on centers, supported these rafters or plates. The framing was completed by purlins of 2 in. x 8 in. material, spaced 2 feet on centers and blocked solid over the rafters and down the center of each span. Sheeting of 1 in. x 6 in. material laid at right angles to the joists and covered with split-sheet roll roofing, mopped on, completed the roof construction. The partitions were of 2 in. x 6 in. studding spaced 2 feet on centers and sheathed on one side with 1 in. x 6 in. V shiplap from the floor line to the ridge.

Each stall was provided with a 12 ft. x 12 ft. door opening equipped with accordian folding doors, made in four sections and supported by an overhead track. Windows were the double-hung type, 3 ft. 4 in. x 5 ft. 6 in.

Heating was provided by an H.C. Little D.U. 46 oil-burning heater installed in a 6 ft. x 6 ft. addition, located in the rear or west side of the main building. Through ducts leading from the heater to each stall the hot air was circulated by the [redacted] fan within the heater.

An air-driven Weaver heavy duty twin-post hoist was installed in the lubrication room. Water was piped into the building for use in washing equipment and cleaning floors. The floors were provided with sumps and floor drains which were connected to the sewer mains. Electricity for lighting and the operation of tools and equipment was connected with lines adjacent to the building. Each room or stall was equipped with a work bench for use by the workmen employed.

The exterior of the walls, windows, and doors was painted to protect the lumber from the weather.

H Addition to the Caucasian Mess Hall

An addition was made to the original Caucasian mess hall that had been constructed under the supervision of the U.S. Engineers. This addition was justified to provide adequate accommodations for the appointed personnel. This building was of the same type construction as the old section, with dimensions of 20 ft. x 100 ft. The foundation was of concrete blocks with 4 in. x 6 in. girders and 2 in. x 6 in. joists.

The east side of the old section was removed and the top plate was reinforced by the addition of 4 in. x 6 in. girders, supported by 4 in. x 6 in. posts spaced 8 feet on centers. The roof was gabled the same as the old section with one end of the rafters resting on the center girder. This formed a gutter through the center of the building, which was raised in the center in order to drain the water to the rear and front.

The north end, or kitchen section, was re-arranged for the convenience of the cooks and kitchen help. A storage room, office, scullery, and utility room and bath were added. Additional hot water was provided in the addition of a 9 ft. x 22 ft. room with a concrete floor, where a Hanson boiler that was not being used in one of the blocks was moved in and connected to the existing piping, thus assuring an adequate supply of hot water for cooking, dish washing, and cleaning.

I Rock Sentry Houses and Police Posts

Three sentry buildings were constructed; two of them being within the Center and one at the entrance of the Military Post. These were all constructed of native stone, hand cut, and set in cement mortar. The sentry house at the main gate of the Center was 13 ft. x 13 ft. x 9 ft. on the outside, while the inside measured 11 ft. x 11 ft. x 8 ft. The MP post in the Center measured 8 ft. x 10 ft. x 8 ft., and the sentry house at the military camp measured 5 ft. x 7 ft. x 7 ft.

The outside walls of all three were built on a batter of approximately 1 1/2 inch per foot of rise but the inside walls were built plumb. In three walls windows were installed and a glass-paneled door in the fourth. Floors and floor joists were of wood. The roofs were of hip type with 2 in. x 4 in. rafters and 1 in. x 6 in. sheathing covered with cedar shingles.

Each building was equipped with inside electric lights and canopied exterior lights. These exterior lights were necessary for the identification of persons entering or leaving the Center or Military Post area at night.

J Childrens Village Heater Room

In the Childrens Village, used as an orphanage, an H.C. Little automatic oil-burning hot-water heater had been installed in a room adjacent to the living and sleeping quarters; but as a safety measure, the heater was moved to a 6 ft. x 6 ft. outside room adjacent to the main building. This latter room was constructed with a cement floor, with 2 in. x 4 in. studding spaced 2 feet on centers covered with 1-inch sheathing and 15-lb. building paper. The roof was shed type with 2 in. x 4 in. rafters and 1-inch sheathing covered with roll roofing.

K Boiler Room at Military Post

To provide an adequate supply of hot water for the kitchen and mess hall at the Military Post, a shed-type room, 7 ft. x 10 ft., was constructed on the east side of the kitchen, where a boiler (Pan American type 40B, size 185), which was supplied by the Army, was installed by WRA.

This building had a concrete floor; the studdings were of 2 in. x 4 in. material spaced 2 feet on centers and sheathed with 1 in. x 6 in. V shiplap. The roof was of 2 in. x 4 in. rafters and 1 in. x 6 in. sheathing covered with 90-lb. mineral-surfaced roofing.

L Gas Service Station

To expedite the servicing of the automotive equipment at Manzanar and to provide storage for the oil and grease, a 1-room building, was constructed approximately [illegible] feet west of the motor pool office. This room, 10 ft. x 16 ft., with a concrete floor projecting 4 feet beyond the front side of the building, was constructed with 2 in. x 4 in. rafters spaced 2 feet on centers with 1-inch sheathing covered with building paper. The roof was shed type with

2 in. x 6 in. rafters spaced 4 feet on centers extending 4 feet beyond the front wall forming a canopy or shade for changing tires.

The walls were 7 feet in the clear on the low side and 8 feet on the high side or front. Casement type sash windows were installed in the back wall and a sash of the same type was used on each side of the door, which was placed in the center of the front wall. A work bench, oil-drum rack, and tire racks were built.

Electric lines were extended from the motor pool to provide light for the servicing of cars after dark or for emergency calls during the night.

M Oil Distribution Sheds

Oil sheds were constructed in each block, adjacent to the oil tanks, to house the oil containers and distributing cans; to protect them from dust, dirt, and inclement weather, and to provide a regular storage place as protection against fire. There were 28 such sheds each 4 ft. x 6 ft. x 5 ft. enclosed on two sides and one end, with a door on the other end. One was located in each block on the south side of the oil distribution tanks.

They were framed with 2 in. x 3 in. studding in the corners and 2 in. x 2 in. plates, top and bottom. The siding and roof were of 1 in. x 4 in. tongue-and-groove flooring, applied vertically to the wall. The roof was sloped 6 inches for drainage, then covered with 90-lb. roll roofing. The exteriors were painted as a protection against the weather.

N. Dehydration Plant

A dehydration plant was installed to provide facilities for the processing of surplus vegetables raised on the Center farms. This project consisted of a drying room constructed with 2 in. x 4 in. material for framing and covered with 1 in. x 4 in. tongue-and-groove flooring. The room was fitted with racks for holding the ventilated trays.

The equipment for drying or dehydrating consisted of an oil-fired furnace or blower that forced the hot air into the room through ducts. The room ducts and trays were constructed by the Engineering Section while all machinery installations were made by the Industrial Section.

O Rice Malt Room

The construction of a rice malt room was necessary for the preparation of rice malt used in the making of miso, a Japanese food, to supplement the mess hall diet. This room was built in the north end of camouflage building 4 and was 12 feet square with 7-foot ceilings. It was framed with 2 in. x 4 in. material and ceiled inside and out with 1 in. x 4 in. tongue-and groove flooring. Hot-air ducts and electric lights were installed. The lights were connected from a line within the camouflage building, while the hot-air ducts were connected to a heater and blower used within the camouflage building for the dehydration of vegetables.

P Men's Latrine in Block 15

The men's latrine in block 15 was almost totally destroyed by a wind storm so that reconstruction became necessary. A small portion of the west and south walls was left standing and had to be replumbed and braced. The wrecked section was torn apart and cleaned of nails that were re-used in the reconstruction. Very little new material was necessary since the plumbing to the boiler installations was not damaged.

Q Duck Boards for Food Warehouses

In order to comply with WRA regulations governing food storage as set forth in the Handbook, Mess Operations, 50.6.11, the construction of duck boards for the food warehouses was considered justified. These boards were constructed with three 2 in. x 8 in. stringers, 8 feet long and spaced one inch apart to allow for ventilation. This made a panel 8 feet long and 4 feet wide. By placing these panels side by side various sized platforms could be arranged to suit the requirements of the crated or sacked foods that were placed upon them.

R Garbage Can Wash Rack

As an absolute necessity in cleaning and sterilizing daily 250 garbage cans was a garbage can wash rack. This was built adjacent to the hospital boiler house which provided steam for the operation.

A concrete platform, 18 ft. x 35 ft., was built and two steam and hot water cleaners were installed. These cleaners consisted of a circular steel pipe perforated to allow for the flow of steam and hot water. The cans were placed, with the bottom side up, over these rings and a flow of hot water and steam was applied, cleaning and sterilizing the can in one operation. The grease and garbage thus removed was washed into a grease trap and sump that was connected to the main sewer line.

S Hospital Incinerator

To provide a sanitary method to dispose of contaminated refuse from the hospital wards, morgue, and operating room, an incinerator was built. This structure was of native stone with outside dimensions of 8 ft. x 8 ft. x 6 ft. and a stack 12 feet high of the same material. It contained a fire box, 4 feet in width and 5 feet in depth, with an overall height of 3 ft. 6 in. A grate of 1 1/2-inch pipe raised 16 inches from the bottom was installed. The space beneath the grate acted as an ash depository and also regulated the draft through two sheet-metal doors that were installed on the ash depository; another two were placed on the fire box.

As a safety measure to prevent the spread of fire, a cement slab was laid extending 4 feet on each side of the incinerator and 10 feet out in front.

T Building Schedule and Costs

Table 5 gives a schedule of building construction completed by the Engineering Section at Manzanar after the WRA assumed control of the Center on June 1, 1942. The floor area, dates of construction, and estimated and final cost are given for each job.

II UTILITY EXTENSION CONSTRUCTION

In order to provide water, sewage disposal, electric lights, and power to the buildings and other structures built and maintained by WRA, it was necessary to add extensions to the utilities. A description of such construction followed.

A Staff Housing

The staff housing was constructed in an area so far removed from existing power lines and utilities that it was necessary to

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TABLE 5

SCHEDULE OF WRA BUILDING CONSTRUCTION
AND COSTS AT MANZANAR

Project	Area in sq. ft.	Date started	Date compl.	Est. cost	Final cost
Staff housing	32,000	1/15/43	3/31/44	$123,972	$110,633
Gymnasium-auditorium	14,140	1/28/44	9/30/44	26,250	30,365
Poultry farm	29,528	7/ 8/43	12/31/43)	65,047	21,784
Hog farm	3,040	9/ 1/43	4/30/44)		7,616
Root cellar	2,600	7/ 5/43	10/28/43	1,916	1,438
Industrial latrines	768	9/ 8/43	11/ 1/43	3,000	2,433
New garage	1,440	11/20/44	4/23/45	1,149	2,301*
Caucasian mess	2,000	5/ 1/43	7/ 1/43	2,000	1,680
Rock sentry and police station	284	10/ 1/43	5/10/44	800	700
Boiler room, Military Post	70	6/ 1/44	7/ 5/44	100	100
Gas service station	160	11/ 1/42	12/ 6/42	125	125
Oil-distribution sheds	624	4/ 8/43	12/ 2/43	1,250	1,014
Dehydration plant	233	7/29/43	9/30/43	600	428
Rice malt room	270	10/16/43	12/17/43	233	233
Men's latrine, bl. 15	600	6/14/43	6/26/43	121	121
Duck boards	2,000	8/ 1/44	10/6 /44	236	236
Total	89,787	---	---	225,844	181,196

* Includes $924 for hoist and $150 for heater, making a total of $1,074 that was not included in the original estimated cost of building.

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install five new poles complete with cross arms, insulators, brackets, and guy wires. There were 920 lineal feet of primary wiring, 2,850 lineal feet of secondary wiring, six 50-K.V.A., two 15-K.V.A., one 37 1/2-K.V.A., and one 7 1/2-K.V.A. transformers installed.

To bring water to the buildings and to provide fire protection it was necessary to install 1,323 feet of 3-inch and 270 feet of 2-inch black iron pipe, and 830 feet of 1 1/4-inch galvanized iron pipe, including bibbs and gate valves. For additional fire protection, three 3-inch and two 6-inch fire hydrants were installed.

The sewer lines consisted of 1,025 feet of 8-inch, 510 feet of 6-inch, and 1,294 feet of 4-inch vitrified clay pipe, as well as six brick-lined manholes complete with cast-iron rings and covers.

B Poultry and Hog Farms

To provide lighting to the poultry farm, five poles were set and 1,924 lineal feet of electric wiring was used. For the same purpose at the hog farm, eight poles were set and 5,200 lineal feet of wiring was used.

To supply water and fire protection to the poultry farm, 1,777 feet of 4-inch and 65 feet of 2-inch black iron pipe, 95 feet of 1-inch galvanized iron pipe, and four 3-inch fire hydrants were installed.

Water for the hog farm was supplied from George's Creek through 800 feet of 8-inch concrete irrigation pipe into a concrete box or tank 10 feet square and 6 feet deep, where the water was

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carried through 250 feet of iron pipe to the feeding pens. From this point the water was distributed through 415 feet of 1-inch pipe and 195 feet of 1/2-inch pipe.

C New Garage

Electric lighting and power for the new garage was provided by extending approximately 750 feet of wire from a 15-K.V.A. transformer located on a pole at the south end of the reefer house.

A 1-inch water line of 100 lineal feet was extended from the old garage building and connected with water piping installed within the building.

The disposal of sewage was taken care of through the installation of 400 lineal feet of 4-inch vitrified clay sewer pipe and one brick-lined manhole.

D Well 169

To provide a stand-by source for domestic water supply in the event that Shepherd Creek should freeze over during the winter months, and to increase pressure in the mains in case of fire, a 9 ft. x 9 ft. frame building with concrete floor and base was constructed to house the installation of a 20-H.P.Pomona pump and motor, complete with 6-inch suction pipe and one 20-H.P. 220-volt [redacted] 20-H.P. 220-volt magnetic starter.

To connect with the mains, 400 lineal feet of 6-inch steel pipe, complete with fittings, was laid. For electrical connections to this pump, it was necessary to install 3,200 lineal feet of overhead wire and one 15-K.V.A. transformer.

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E Enlargement of Reservoir

In order to provide an adequate supply of domestic water for the camp, the storm reservoir on Shepherd Creek was enlarged from 540,000 gallons to approximately 900,000 gallons. This was done by raising the concrete-lined embankments to a sufficient height.

III REMODELING CONSTRUCTION

A Reflooring of Warehouses

The original flooring that was laid in the 40 warehouses was of single thickness, 1 in. x 6 in. shiplap. Owing to the constant wear and tear, it became necessary to refloor 30 of these buildings, which had an area of 1,881 square feet per building. This required approximately 2,351 square feet of 1 in. x 4 in. Douglas fir flooring per building.

B Interior Lining of Partitions in Evacuee Buildings

The evacuee barracks were originally constructed with three cross partitions of plywood running from the ceiling to the ridge, supported by 2 in. x 4 in. studding plates and cross ties. No interior linings or ceilings were provided for the walls, floors, or ceilings. It was found that four apartments to a building were insufficient in number to accommodate the family groups included in a population of 10,000 evacuees. In addition, the walls, flooring, and ceilings afforded too little protection against the cold winds and dust prevalent during the winter months and early spring.

To provide sufficient housing and livable quarters for the evacuees, the USED supplied the material to WRA (except for the plasterboard) for partitions and floor covering. The walls and ceilings in 460 barrack buildings were lined with plaster board, and an average of two partitions per building were added to make additional apartments. The floors were covered with Mastipave floor covering in all apartments. There were 36 mess halls which were ceiled with plaster board. Mastipave floor covering was used in 20 of these buildings. Each buildings, with the exception of the mess halls, was 20 ft. x 100 ft. with an inside floor area of 1,881 square feet. Approximately 3,780 square feet of plaster board and 222 square yards of Mastipave floor covering was used in each of the 460 barrack buildings. The 36 mess halls required 5,564 square feet of plaster board and 445 square yards of Mastipave floor covering per building.

Each of the 30 recreation halls required 3,564 square feet of of plaster board. In each of 20 of them 222 square yards of Mastipave floor covering was used.

C Relocation and Records Offices

Since the Relocation Office in building 4 and the Records Office in building 5, both in block 1, depended on each other for data concerning evacuee records, more space and safer storage were needed; as a result, an addition or annex, 20 ft. x 40 ft., typical T.O.-type construction, was built connecting these two buildings. This annex was partitioned off into three rooms for use of The Relocation Officer and his assistant. In buildings 1-4 and 1-5, partitions were rearranged to provide more convenient handling of the work for both the Relocation and Records Offices.

D Electric Work and Plumbing in Warehouse 5

In order to handle the maintenance program more efficiently and release space for other use, the following work was done.

A board partition was built dividing the electrical and plumbing warehouse into two sections. The north section of the building was used by the electrical unit and for the storage of plumbing supplies. One corner, 12 ft. x 16 ft., was partitioned off for an office. The rest of the space was utilized with wood shelves and bins for the storage of electrical and plumbing supplies. The south section of the building was left vacant.

E Hospital

The hospital ward floors and most of the enclosed walks were constructed without any floor covering, but due to excessive mopping and cleaning, they soon became badly worn and in need of either replacing or extensive repairing. To avoid the expense of this repair, and to make the floors easier to clean and more sanitary, Mastipave floor covering was laid in seven wards, each having a floor space of 25 ft. x 150 ft., and in 500 lineal feet of enclosed walks. For all this it required 3,100 square yards of Mastipave and 200 gallons of linoleum paste.

Then, too, when the hospital was constructed, no interior wall covering was provided for the walls or ceilings. In order to keep this building clean, it was found necessary to cover the walls and ceilings with plaster board. This was a difficult job because the overhead sprinkler system, and other piping that had been installed overhead, necessitated the use of additional furring and blocking in

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order to leave the sprinkler system exposed below the ceiling line. Approximately 3,500 square feet of plaster board and 2 in. x 3 in. material for furring and backing was used.

As Caucasian doctors replaced evacuee doctors who were relocating, it became necessary to remodel the doctors' quarters, for the Caucasian doctors requested housekeeping facilities which had not been supplied to the evacuee doctors occupying the same building. This building was of typical barrack-type construction and was divided into four apartments of equal floor space. Very little remodeling was done within the rooms, but sinks, kitchen cabinets, and storage closets were installed.

F Schools

In view of the revocation by the War Production Board of construction of new buildings for school purposes, it was found necessary to convert existing temporary barracks into school rooms. To meet minimum standards with regard to space requirements, lighting, heating, and sanitation, the following work was done for the high school in block 7 and for the elementary school in block 16. In these buildings 54 partitions, 20 ft. x 8 ft., had to be removed and 41 new partitions constructed. The installation of 312 additional windows was necessary to afford sufficient and proper lighting. To provide separate entrances to the classrooms and to comply with fire regulations, 155 new doors were installed. Approximately 90 additional lighting fixtures were added to give sufficient illumination for night classes. Mastipave floor covering was laid in five buildings.

The woodwork in all classrooms was painted, and the walls and ceilings were kalsomined. Shelving was installed in the supply rooms; 30 drinking fountains were added.

In the south half of building 8, block 16, a 4-burner electric range, a refrigerator, and a sink were installed for use in conjunction with the adult English classes. These installations were considered necessary by the Education Section to augment and develop an adult English program where English was taught functionally to Issei men and women through classes in family cooking, food, nutritive values, and child development, as stipulated by the WRA Washington Office.

Oil-fired space heaters, connected to outside oil supply tanks, were installed in 42 classrooms in the school buildings.

In block 7, building 10, a homemaking program was developed in the high school. This room was made over into a model 2-room apartment; a 4-burner electric range and a refrigerator were installed. In blocks 2 and 7, the ironing rooms were remodeled and used as clothing rooms for the high school students. The chemistry and physics classes were conducted in the remodeled laundry room in block 7.

Facilities were provided for preschool classes in the following locations: building 14, block 1; in half of building [redacted] blocks 9, 20, 23, and 32; in one-third of building 15 in blocks 17, 30, and 31, and in building 15, block 11.

G Mattress Factory at Warehouse 25

In the cotton mattress factory a training program for many evacuees who had no trade, was developed to facilitate relocation.

In addition to the occupational training it provided, the manufacture of these cotton mattresses made it possible to replace the old straw ticks and thus eliminate a fire hazard.

The necessary remodeling was done in warehouse 25 and consisted in reinforcing the underpinning and girders and laying a 1 in. x 4 in. floor over the original flooring. Work benches were constructed and a motor-driven blower and shredding machine were installed. To operate the electrical equipment an additional 25-K.V.A. transformer was also installed.

H Community Hostel

A community hostel was set up in building 15, block 34, to provide treatment and care for patients whose illnesses were not serious enough to demand full hospitalization, thus relieving the crowded condition at the hospital. The following remodeling work was done in the hostel:

A barrack-type buildin , 20 ft. x 100 ft. located directly east of the hospital and close enough for the convenience of the hospital staff was partitioned into three sections. One section was for men, another for women, while in between the two sections were baths, toilets, and a diet kitchen. An H.C. Little hot-water heater was installed in a [redacted] building to supply hot water to the bathrooms and kitchen.

Wooden ramps equipped with hand rails were installed at all exit doors as an aid to those who needed this kind of help in entering and leaving the building.

I Warehouse 36

Quarters were needed to replace the maintenance office and store room that were destroyed by fire on July 28, 1944. For this purpose the north half of warehouse 36 was remodeled and used as an office by the maintenance unit. Plaster board was placed on its ceiling and walls, and additional windows were added. Mastipave floor covering was laid on the floor; the ceiling and the walls were kalsomined.

The south half of the building was fitted with shelving and bins for the storage of equipment, supplies, and materials.

J Appointed Personnel Recreation Building

To provide recreational facilities for the appointed personnel, many of whom did not have automobiles or other means of transportation to the nearby towns, an existing barrack-type building was remodeled. Partitions were relocated and the building divided into three rooms. The south room was used for floor games and other activities, the center room for light refreshments, and the north room for cards, reading, and table games. In the refreshment room a serving counter, sink, and four booths with tables and benches were installed; as also a butane hot water heater to supply hot water for washing dishes and the wash rooms. The floors were covered with Mastipave, and the walls and ceilings were kalsomined.

K Canteen and General Store

Building 14, block 8, was used by the Business Enterprises for a canteen and store building. The flooring was so badly worn from

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constant use that a new floor was laid over the old one. The walls and ceiling were covered with plaster board so as to make the building more easily heated, to keep perishables from freezing in winter, and to eliminate dust that sifted in through cracks and around windows of unlined walls.

L Motor Pool Office

The Motor Pool office was formerly located in a portion of a barrack-type building in block 2 which was not conveniently located to the garage and storage lot. To provide adequate office space for the handling of affairs pertinent to transportation, and old USED office building was moved adjacent to both the fenced parking lot and the garage. This building required very little remodeling and repairs. An additional partition was added and the location of two existing ones changed. Floors were patched and the walls and ceilings were kalsomined. A counter was built in the dispatcher's office and electric wiring extended from the power line adjacent to the building.

M Administration Building

The Administration building was originally constructed without any wall or floor covering and was divided into 4 large offices. In order to eliminate dust and dirt, and [redacted] interior was lined with plaster board and the floors covered with Mastipave.

Because the number of appointed personnel increased and more duties were added, it became necessary to divide the interiors into smaller offices which gave each office more privacy. The partitions were of plaster board constructed in the same manner as were those in other buildings in the Center.

B Butcher Shop

To provide more storage space and to facilitate the handling of meat stored in the reefer house, the following work was done:

All the meat-hanging racks were removed and replaced with racks of heavier material which doubled the capacity of the original installation.

During the heat of the summer, the temperature in the room housing the refrigeration machinery often rose to such a degree as to interfere with the normal operation of this equipment. To overcome this difficulty the interior of the room, housing the refrigeration machinery for the meat and vegetable storage, was lined with plaster board and a 16-inch suction fan was installed in each room to draw in outside air.

C Shoyu Factory

The shoyu factory for the making of shoyu, a Japanese food manufactured from soybeans and used in the mess halls to supplement the regular food, was set up in the ironing room and the laundry building in block 1. To provide sufficient space for the manufacture of this article, an addition was built connecting the two buildings.

This addition was of regular army T.O.-type construction with 2 in. x 4 in. rafters spaced 4 feet on centers. The roof and walls were sheathed with 1-inch material. The roof was covered with 15-pound building paper. A ~~cement~~ concrete floor was laid and a floor drain was installed which connected with the sewer line.

P Equipment Shed 4

Equipment shed 4 was used by the Agriculture Section for the storage of seed and fertilizer. It was originally built with the front side open to store farm equipment. However, for the storage of seed and fertilizer, the front side had to be closed in to keep out the rain, snow, and dust.

Studding of 2 in. x 6 in. material was placed 4 feet on centers with horizontal cross ties also spaced 4 feet on centers. Sheathing of 1 in. x 12 in. was used, the whole exterior was recovered with 15-lb. building paper, and a new roof of 90-lb. felt was applied. Large louvers were installed in each end of the building to provide ventilation.

Q Evacuee Post Office

The location of a plaster board partition was changed in the evacuee post office to provide more work and storage space; approximately 200 square feet of additional shelving was installed.

R Engineering Office

Additional office space was needed in the Engineering Office building for drafting and to relieve a generally overcrowded condition Partitions were changed to make use of an additional 15 feet of the building for a drafting room. The room was equipped with files for plans and maps, and new equipment, such as drafting tables, a blueprinting machine, and a washing tray were added.

A door opening was made, connecting the main office with the drafting room. A partition was moved to provide more space in the

Senior Engineer's office. The lights were rearranged to provide better lighting.

IV REFRIGERATION

Refrigeration for the Center was supplied by electrically operated equipment of different sizes and types for storage buildings, mess halls, and appointed personnel quarters.

For the storage of vegetables and meats two refrigerated warehouses were used with a storage capacity of approximately 11,000 cubic feet. Each warehouse was equipped with four evaporator condensors of humid-air type. The compressors were Brunner, model E, type E.C., driven by 7½-H.P., 220-volt, 3-phase Fairbanks Morse electric motors. Drayer Hanson condensing units were used, equipped with 1/4-H.P. Pacific Pumping Co., 1 1/4-inch water pump. Mess halls within the Center and at the Military Post were equipped with 35 20-cubic foot refrigerators: 32 Supercold, 2 Viering, and 1 Catalina.

The 40-cubic foot refrigerators in the mess halls, at the hospital, and at other locations included: 37 Ward, 1 Supercold, and 1 Barker Bros. In addition, there were three 50-cubic foot Bussman-Ligionier boxes for replacements, and a 4-body Market Forge, model SMA, forced-air type unit, with York compresser, was installed at the hospital morgue.

Exclusive of the morgue installation and the refrigerated warehouses, there were 77 commercial refrigerators within the Center.

Domestic or household installations comprised 90 units and consisted of the following:

Number	Size in cu. ft.	Make
63	8	Coldspot
7	7	Westinghouse
2	9	Westinghouse
11	7	Frigidaire
6	9	Frigidaire
1	3	General Electric

CHAPTER 3

LAND IMPROVEMENTS

Manzanar Relocation Center comprised an area of 5,464.09 acres all in T.14 S R 35E, except the garbage pit in T. 14 S R 36 E. (See map "Land Improvements" Appendix 1, Figure 6.) The following is a brief description of this acreage:

Location	Area in acres
Project bounded area	5,414.90
Well 75, 150 ft. x 600 ft., along the east right of way of U.S. highway 395	2.07
Well 92	.72
Pipeline to well 92	1.90
Road to Well 92	1.70
Road to sewage treatment plant	5.30
Main trunk-line sewer pipe	5.10
Sewage treatment plant	6.30
Sewage outfall ditch	6.20
Garbage pit east of Owens River	19.90
Total	5,464.09

The program for land improvements consisted of the following: clearing and developing Center and agriculture [illegible] constructing irrigation and drainage system, streets and roads, bridges and culverts, and fencing.

I CLEARING AND DEVELOPING

Most of the land to be developed had at one time been covered with orchards or farms which meant that extensive further development was not needed. The Center's program consisted of clearing sage and other smaller brush and leveling the land for irrigation. Because of wind erosion of the light sandy soil, leveling of the agricultural land was extensive. In all, approximately 360 acres were cleared and improved. Approximately 80 percent of the Center area and 1 percent of the agricultural land had been cleared and developed by WCCA, the rest so developed was cleared and improved by the WRA Agricultural and Engineering Sections. The cost for this work is not available.

II IRRIGATION AND DRAINAGE

Approximately 12.3 miles of irrigation ditches and pipelines were constructed for agricultural purposes. The water from George's Creek, Bair's Creek, and Shepherd Creek was distributed for irrigation through pipelines and ditches by gravity. As these creeks are fed by melting snow on the Sierra Nevada mountains west of the Center, there is considerable fluctuation of the streams. George's and Shepherd Creeks flow some all year, but Bair's Creek dries up in late summer. Due to the fluctuation and the insufficient supply of water for the late crops. the irrigation system at Manzanar was supplemented by the City of Los Angeles' water and power wells in the area. Wells 76 and 95 supplied water for the fields south of the Center and well 92 for part of the fields north of the Center. Because of a crooked casing, well 99, in the north area, could not be used.

The WRA Engineering Section built a concrete dam on Shepherd Creek and distributed water from there to farm-area ditches through open laterals lined with rock and concrete. These laterals were approximately 5 feet wide at the top, 3 feet wide a the bottom, and 3 feet deep. Wood flumes were constructed over coulees in this system. The farm area had a system of open ditches lined with rubble and concrete. These ditches were approximately 3 feet wide at the top, 1 foot wide at the bottom, and 1½ feet deep with wood gates for controlling the water.

A concrete dam was built on George's Creek and connected by 7,450 feet of 12-inch concrete pipeline with the control box. This in turn connected with the existing system on Bair's Creek, from which the outlet emptied into open ditches lined with rubble and concrete that distributed the water in the south fields. Wood gates were installed in these ditches for controlling the water.

The entire irrigation system, including the pipelines from the wells and all open-lined laterals, cost approximately $27,980. As the Cost Accounting Section does not have the cost records for 1942, and only part for 1943, this cost was arrived at from available records in the Engineering Section. It is believed to be as close an estimate as can be obtained. For the irrigation system see map "Land Improvements" Appendix 1, Figure 6. Pipe lines and ditches constructed for irrigation were as follows:

Construction	Size in Inches	Linear Feet
Pipes		
Concrete	12-inch	9,740 feet
Concrete	10-inch	700 "
Concrete	8-inch	2,015 "
Steel	12-inch	3,129 "
Steel	8-inch	1,676 "
Total pipe lines		17,260 "
Ditches		
Open concrete-lined		49,902 "
Total: irrigation pipe and ditches		67,162 " (approx. 12.3 miles)

III STREETS AND ROADS

There were approximately 14 miles of oiled-surface streets in the Center and 1½ miles of oiled-surface roads in the farm area outside of the Center fenced area, making a total of 15½ miles. Approximately 5½ miles of dirt roads were constructed in the farm area, and to the reservoir and sewage treatment plant.

The cost for street and road construction was low due to the type of sandy soil which required very little additional gravel before the surface could be oiled. Due to the topography of the Center and the small amount of rainfall, the streets and roads were elevated very little above the adjacent ground. This factor also made it unnecessary to install many drainage structures.

All surfacing of streets and roads was by the penetration method using M.C. 2 asphalt, except at the entrance to the Center from highway 395 and the one block on First Street, which was road-mixed to carry heavy traffic of large freight trucks.

The U.S. Engineers contracted for surfacing 151,808 square yards of streets at a cost of $14,574. As this work was done on parts of different streets, it is difficult to give a mileage breakdown separate from surfacing done by WRA.

WRA surfaced new streets and parking areas for staff housing completed surfacing of streets in the Center, and constructed and surfaced roads in the farm area. The penetration coat of M.C. 2 asphalt applied cost approximately 2½ cents per square yard.

IV BRIDGES

The bridge on the farm road over the north fork of Shepherd Creek was 12 ft. long and 20 ft. wide with stone masonary walls and wood superstructures and deck. The cost was approximately $250.

The bridge on the farm road over the south fork of Shepherd Creek was 12 ft. long and 15 ft. wide with stone masonary walls and wood superstructures and deck. The cost was approximately $150.

The cattle guard on the road to the sewage treatment plant was 9 ft. long and 14 ft. wide. Railroad steel rails were installed on 6-inch centers laid on timber stringers placed on concrete abutments. The cost was approximately $200.

V FENCING

The fence constructed around the Center was contracted for through the U.S. Engineers and is described in Chapter 1, Basic Construction.

WRA constructed fences for the chicken and hog farm, the cost of which is included in Table 5. Other existing fences in the area that were repaired were at the cattle farm, but as this was considered maintenance, the cost is not available under construction.

CHAPTER 4

OPERATION UTILITIES, JANITORIAL SERVICE, AND MAINTENANCE

I OPERATION UTILITIES

A Water

The main source of supply for domestic water was from Shepherd Creek, with an auxiliary supply from wells 75 and 169. The water from Shepherd Creek was impounded within a cement-lined reservoir connected to the creek by a cement-lined ditch and settling basin. From the reservoir the water was carried through a steel pipe into a 90,000-gallon storage tank and distributed from there through mains and laterals throughout the Center area.

Shepherd Creek rises in the Sierra Nevada Mountains and is fed from a chain of snow-fed lakes. Because of this, the stream fluctuates from a maximum of 47 second-feet during early summer to a minimum of 3 second-feet during the winter.

The wells were equipped with electrically driven pumps which were used to augment the water supply during the acute shortage in the winter and also to supply adequate pressure within the mains in case of fire.

Although the water is of the purest type, [redacted] against contamination from any source, two chlorinators were used; one was installed on the supply ditch above the reservoir and the other was located above and adjacent to the storage tank.

The operation and maintenance of the water supply system was under the direct supervision of the utilities superintendent.

He trained and supervised three crews of four evacuees, each working three shifts of eight hours per day, seven days per week. These men were employed in cleaning screens; regulating control valves and gates; cleaning sand traps, storage reservoir, and tank; checking for and cleaning the stream of debris; operating the well pumps when necessary; and servicing the chlorinating machines.

B Sewage Disposal

The sewage disposal system as installed consisted of an outfall system and a sewage treatment plant. Sewage from the Center was carried through the laterals into the mains and thence to the sewage treatment plant.

This plant consisted of a grit chamber, scum and distribution box, clarifier, digester, chlorine contact tank, sludge beds, and a control house that contained an office room, laboratory metering gauges, chlorinator control, and other equipment.

A crew of six evacuees under the supervision of the utilities superintendent maintained and operated the plant. An evacuee chemist was employed to test the water and sewage. The following tests were made on water: algar plates for bacteria count, and [redacted] fermentation tubes to tests for coli. Tests were made on sewage for suspended and dissolved solids, and for determination of dissolved oxygen. B.O.D. tests were also made for oxygen consumed.

C Electric Power, Signal System, and Refrigeration

The electric power, signal, and refrigeration utilities were originally under the supervision of an electrical engineer who supervised two crews of approximately six men each. One crew was for maintenance and repair of the electrical system, while the other crew handled refrigeration. The signal system, consisting of telephones, and the police and fire signals was maintained by the Interstate Telegraph Company.

The above method of maintaining these utilities did not prove too satisfactory. The electrical engineer was very proficient in handling the electrical section, but lacked experience on refrigeration. Consequently, practically all units on refrigeration had to be shipped out of the Center for repairs.

During the year 1945, acting on an order from the Washington Office, the position of electrical engineer was abolished and in its place two positions were set up, one for an electrical foreman and the other for a foreman of refrigeration. This plan worked much better. The refrigerator foreman and a crew of two men serviced and repaired all refrigeration equipment for both domestic and commercial boxes, including the installations in the two refrigerated warehouses. Very little equipment was sent outside the Center for repairs excepting the sealed units that were returned to the factory for replacements.

The electrical foreman performed his duties in a very satisfactory manner, being assisted by from one to four evacuees, depending on the amount and type of work on hand. All maintenance and repairs of electrical equipment, excepting for the rewinding of large motors, were done in the Center's repair shop. These were shipped to an electrical shop in Los Angeles.

At the time the Center closed the condition of the equipment that was in operation was fair. Certain units, no longer in operation, needed considerable work done upon them to put them in good working order.

II JANITORIAL SERVICE

Janitorial services were under the direct supervision of the assistant superintendent of construction and maintenance. An evacuee general foreman, directly responsible to the assistant superintendent of construction and maintenance, gave direct supervision to evacuee foreman of these services.

All supplies and material for the janitors were obtained from the central warehouse upon written requests signed by the assistant superintendent of construction and maintenance.

During the school term, a crew of 28 men and women were employed in the servicing of all buildings connected with both the high school and the elementary school. These schools included the following buildings:

Number	Size
30 barracks divided into classrooms	20 ft. x 100 ft.
1 clinic and recreation room	40 ft. x 100 ft.
1 health unit	[illegible] ft. x 40 ft. 9 in.
1 auditorium-gymnasium	118 ft. x 119 ft.
4 latrines and shower rooms	20 ft. x 30 ft.
1 library and	
2 home economics rooms	40 ft. x 100 ft.

The duties of the janitors consisted of sweeping and dusting all of the classrooms, cleaning windows and woodwork, and servicing and cleaning latrines and shower rooms. During severe winter weather, it was necessary to have the school buildings warm enough for classes when the school days began in the mornings. For this duty a crew of four men were detailed to service and check approximately 70-oil burning space heaters in the classrooms.

A group of 36 men and women serviced the following buildings: Their duties consisted of cleaning, sweeping, dusting, servicing the toilets and showers, changing linen, washing windows and woodwork, and changing linen in the dormitories.

A group of 30 men and women were employed in the servicing of 68 latrines and shower rooms located in the various blocks. Their duties consisted of hosing and mopping the floors of both the latrines and shower rooms; scouring and washing down all toilets, urinals, slop sinks, and wash troughs; spraying with disinfectants; and placing deodorants as needed.

The Administration office buildings, post office, and Town Hall, included 19 buildings having an area of 49,000 square feet of floor space; three dormitories with an area of 3,360 square feet of floor space; three buildings in the Childrens village with an area of 10.250 square feet of floor space.

III MAINTENANCE

A maintenance office and warehouse were maintained to facilitate control of different maintenance crews and maintenance supplies. All maintenance was under the supervision of the assistant superintendent of construction and maintenance and in turn of several appointed personnel foremen of different units. The foremen were assisted by evacuee foremen who also acted as coordinators of different crews. Each crew was supervised by an evacuee crew leader or foreman who answered directly to his general foreman.

The office was in charge of an evacuee chief clerk or manager who supervised a force of approximately 10 clerks, typists, and storekeepers. In this office all records and accounts pertinent to this section were handled. All cost accounts and time sheets were also prepared by the office staff, and a log was kept on oil consumption of space heaters, hot-water boilers, kitchen ranges, and the hospital steam plant. A weekly breakdown was made of all records and a copy submitted to the Senior Engineer in charge of operations. A perpetual inventory of all stock on hand was maintained in the office and a copy was submitted to Property Control at the end of each month.

In order to carry out the maintenance program needed to assure efficient operation of all activities involved, it was necessary to train men for the various crafts and trades as listed below.

A Tinsmiths

Six tinsmiths assumed responsibility for the maintenance construction and repair of all sheet-metal work, including kitchen sinks, wash troughs, urinals, roof jacks, stove pipes, and other equipment.

B Machine Shop

Maintenance and repair of all equipment and machines, except automotive, for all sections in the Center including Agriculture, Mess, Guayule, and Engineering was performed in the machine shop by two men.

C Stoves and Coolers

Duties in the maintenance of stoves and coolers consisted of overhauling, repairing, and maintaining approximately 2,000 space heaters and the servicing and repairing of 90 oil fired mess hall ranges. Twelve men were employed at this job.

D Garbage Crew

The edible garbage was kept separately and used to feed Project-raised hogs. The inedible was hauled approximately four miles to the garbage pit and covered with dirt. The empty garbage cans, numbering approximately 250 per day, were washed and sterilized before being returned to the mess halls. All of this work was performed by a garbage crew of 19 men.

E Rubbish Crew

Rubbish and debris that accumulated around the buildings throughout the Center was collected, salvage material was sorted. Magazines and papers were saved and baled, and all useless cans were crushed for shipment. Nineteen men were employed in this crew.

F Emergency Crew

A crew of 11 men was used to perform emergency jobs, to fill-gaps in the ranks of regularly assigned workers who were off duty on account of sickness or other reasons, and for emergency work for which there was not any assigned crew.

G Grounds and Yard Crew

The grounds and yard crew, composed of 36 men, collected and disposed of all rubbish from the streets and the inside of blocks. They cut and disposed of all weeds, grass, and other combustible material that might create a fire hazard to the Center.

H Grease Crew

A crew of 16 men was employed to remove and salvage grease from approximately 100 grease traps located in mess halls, laundry rooms, and the garbage can sterilisation plant. Waste fat from the butcher shop, together with the grease trap collections, was dehydrated, deodorized, and then packed in drums for shipment.

I Oil Distribution

Oil distribution was a major job and occupied 51 men. One 1,400-gallon tank truck with a 12-man crew, working two shifts, seven days per week, serviced all block tanks, and transferred approximately 8,000 gallons of oil daily from the main storage tanks to the block tanks.

One 600-gallon tank truck, and one rack truck with five-gallon cans, serviced the rest of the Center, including all space heaters and hot-water boilers in the office buildings, schools, auditorium, hospital, personnel quarters, hostel, kitchens, motor pool, Military Post, the water plant, and the sewage disposal plant.

J Hospital Plant

Three [redacted] equipment, consisting of vacuum water and booster pumps, were operated at the hospital by a boiler crew of 16 men. Hourly inspections were made and reports submitted on all water gauges and recording instruments. These men were employed 24 hours per day, seven days per week.

K Hot Water Boiler Operators

The boiler crew of 16 men operated 24 hours per day, seven days per week. They serviced 170 H.C. Little and Hannon hot-water boilers, repairing and maintaining 45 H.C. Little space heaters and seven hot-air furnaces.

This equipment supplied all the hot water for the Center except for the hospital. This also included the auditorium, offices, and other public buildings.

L Water Barrel Crew

A crew of six men serviced and inspected water barrels that were placed in all the blocks and around the hospital, warehouses, and office buildings.

M Maintenance Carpenters

Due to the fact that all buildings and structures within the Center were of temporary construction, the cost o maintenance was very high. It was necessary to make general repairs to roofs, floors, doors, steps, and underpinnings on 883 buildings and structures within the Center Military Post, and chicken and hog farms. In all, 31 men were employed for this work.

[redacted] staff housing, Military Post, Childrens Village, and the hospital.

O Gardening

The Center was located in an area subject to severe wind and dust sorms throughout most of the year. These dust storms created a great menace to the health and well being of the inhabitants and increased the cost of maintenance of motors and other equipments.

To overcome the dust condition, extensive plantings of lawn, shrubs, and trees were made around the hospital, Childrens Village, administrative offices, staff housing, and other public buildings. A crew of 45 men planted the lawns, trees and shrubs, and maintained and cared for them after they were planted.

P Carpenter Shop

The carpenter shop employing four men was maintained for the repairing and rebuilding of administration office furniture and fixtures, staff housing furniture, kitchen cabinets, screen doors, and windows.

Q Painters

Five men were employed at painting and kalsomining which were required to keep the interior of the hospital, Childrens Village, mess halls, office buildings, and staff housing sanitary and clean.

R Irrigation and Roads

A crew of 40 men was employed to maintain and repair approximately 14 miles of oil-surfaced streets within the Center and 1½ miles of oil-surfaced roads in the farm area. There were 5½ miles of dirt roads to grade and [redacted] en route to the reservoir and sewage [redacted] 12,455 lineal feet of concrete irrigation pipe [redacted] feet of steel irrigation pipe, 49,902 lineal feet of concrete-lined ditches to maintain and repair. During the rainy periods and the time of melting snows, the flood waters were spread and controlled to keep debris and soil from entering the Los Angeles aqueduct.

CHAPTER 5

CLOSING PHASES

As the evacuee foremen and other key employees left the Center on relocation in the latter half of 1945, it became difficult to operate and maintain the Project plant. Appointed personnel were hired to replace some of these evacuee employees, but in most cases these new staff members were not on the job in time to obtain the proper training prior to taking over their duties.

Most of the experienced appointed personnel supervisors remained, however. With their full cooperation, operation and maintenance functions were carried on with a minimum of interruption in necessary services. During this time there was a maximum of 45 appointed personnel in the Engineering Section to carry on all work: operation and maintenance, cleaning up and disposing of a large amount of trash in blocks vacated by the evacuees, taking of inventory of equipment and supplies, and returning tools and other equipment to be declared surplus.

Considering the project conditions prevailing during closing [redacted]

APPENDIX 1

MAPS AND PLANS

Figure 1 Organization of Engineering Section, July 1944

Figure 2 Camp Layout

Figure 3 Water Distribution

Figure 4 Sanitary Sewer System

Figure 5 Electrical System and Fire Alarm Telephone

Figure 6 WRA Construction Plot Plan

Figure 7 Land Improvements

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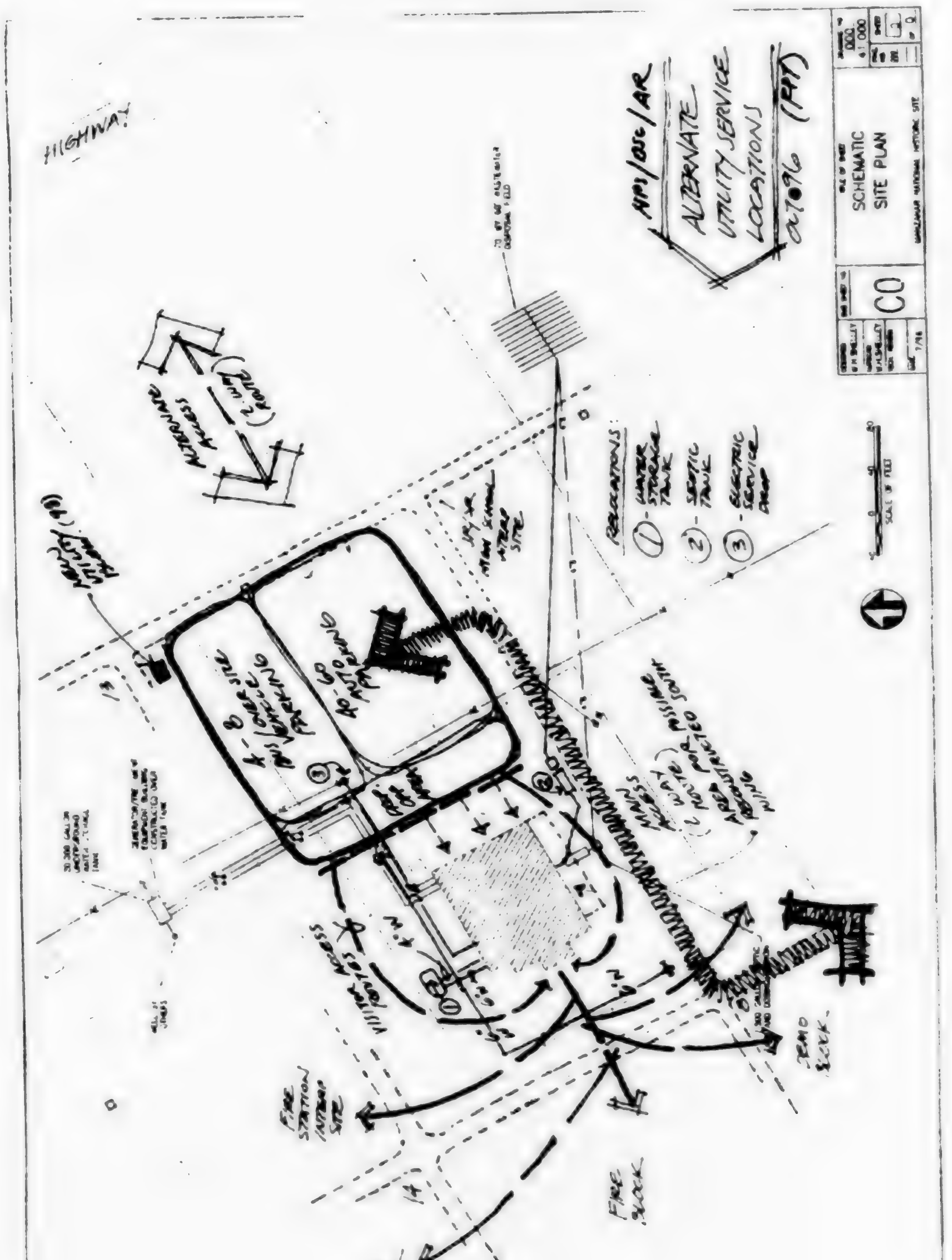
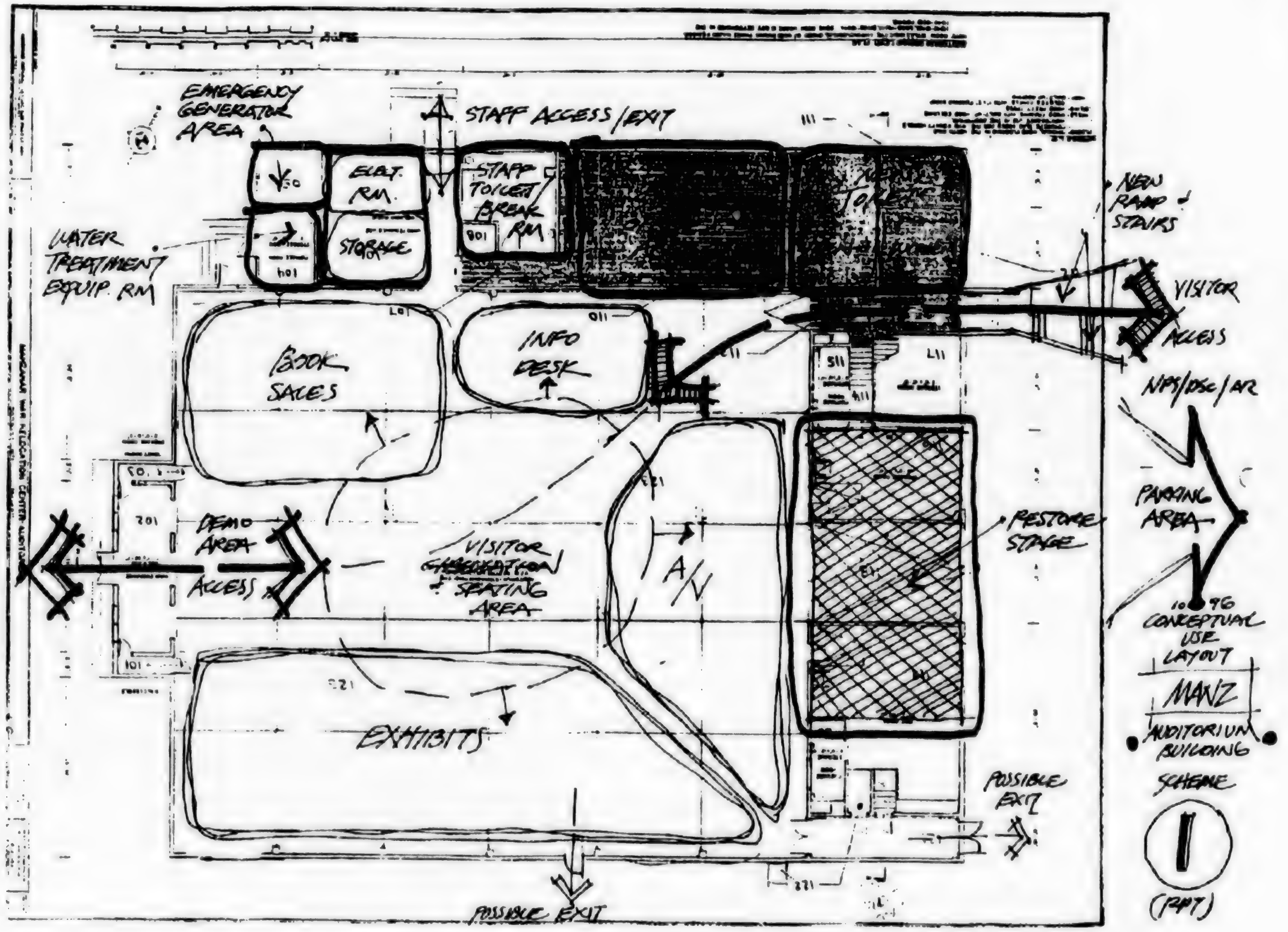
APPENDIX D: SCHEMATIC DRAWINGS

Conceptual sketches of site and building use prepared for site utilities planning, DSC, October 1996.





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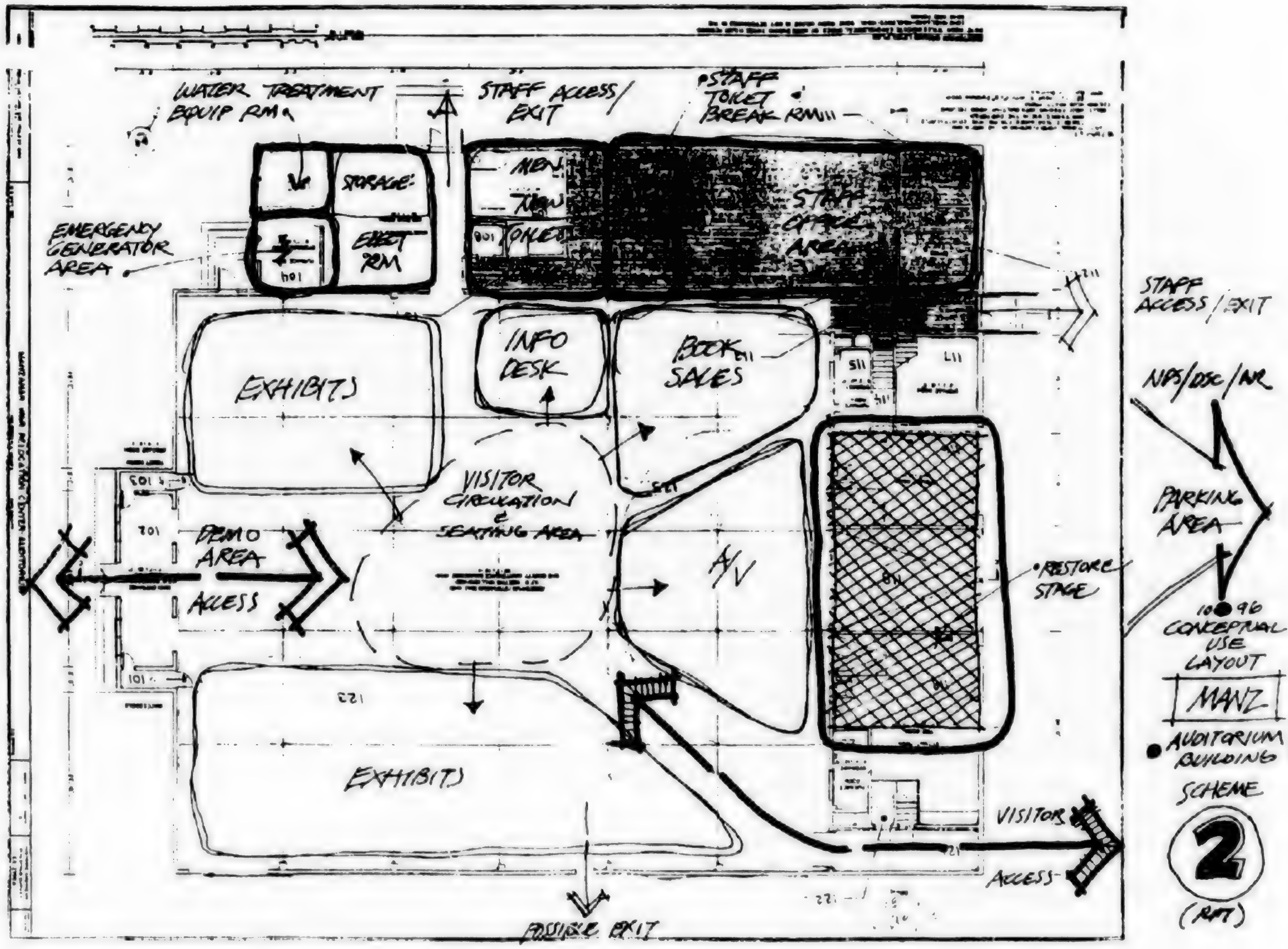
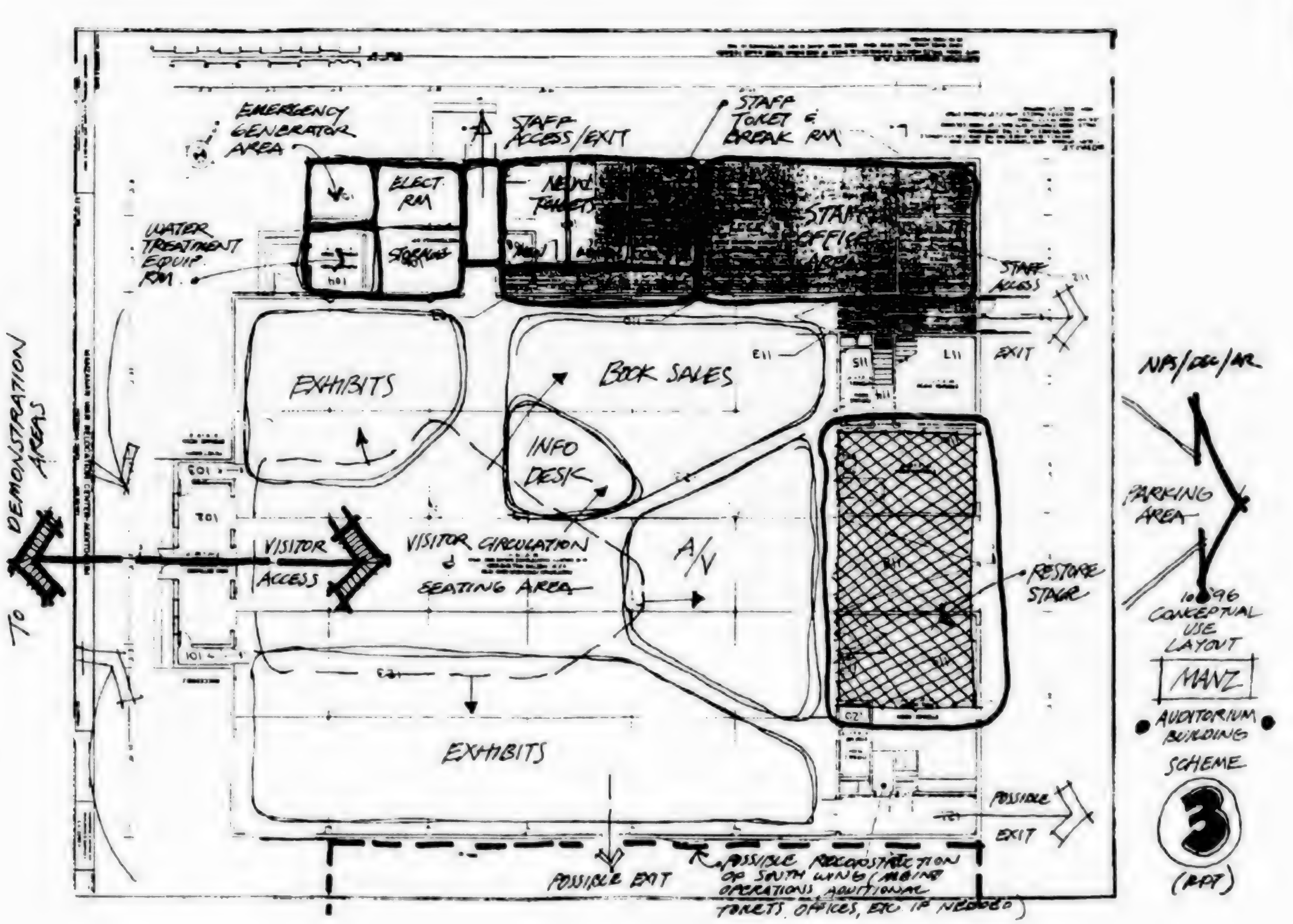
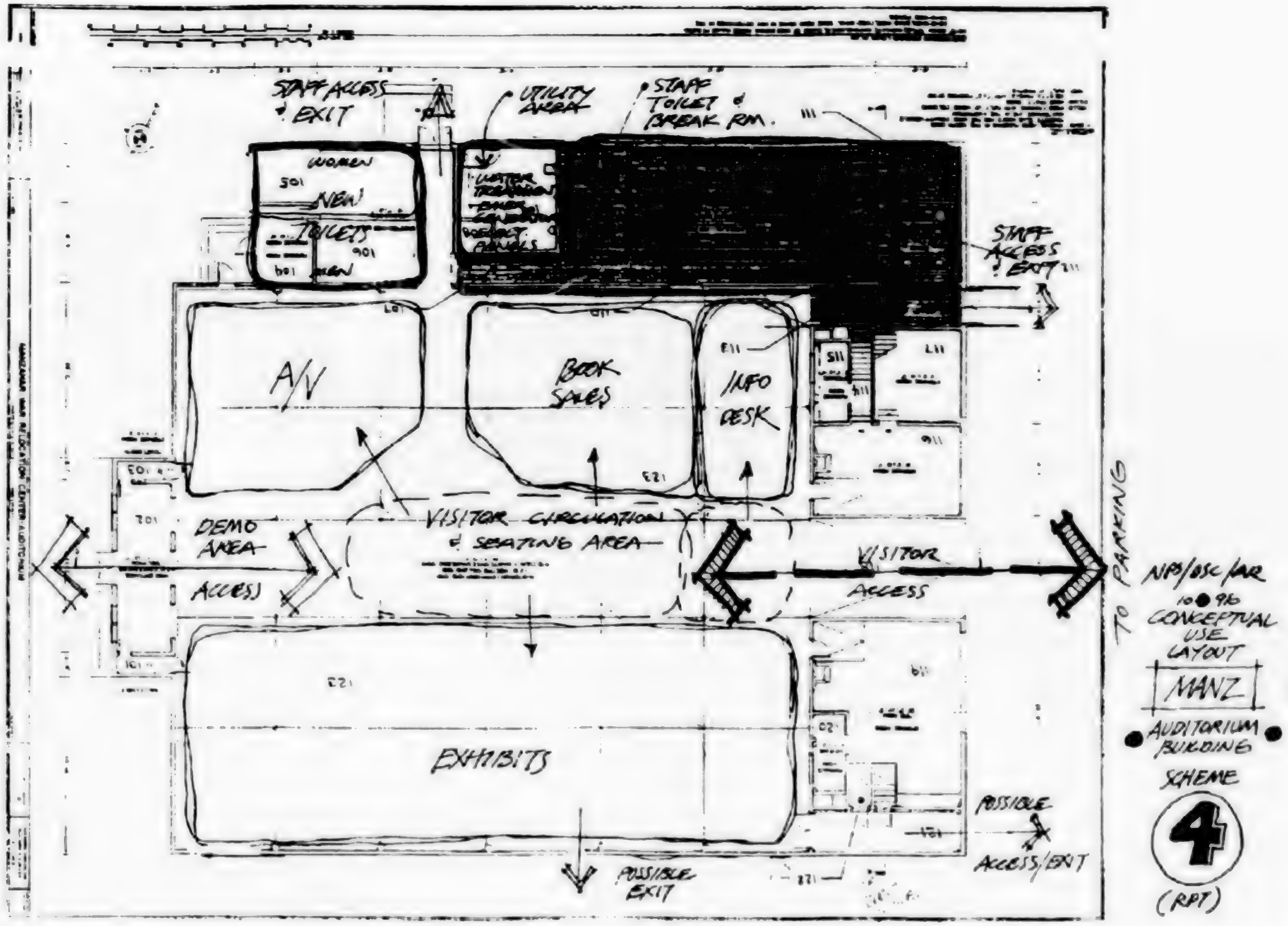

WATER TREATMENT EQUIP RM
STAFF ACCESS/EXIT
STAFF TOILET BREAK RM
STORAGE
EMERGENCY GENERATOR AREA
ELECT RM
MEN
WOMEN
STAFF OFFICE AREA
STAFF ACCESS/EXIT
EXHIBITS
INFO DESK
BOOK SALES
NPS/DSC/NR
PARKING AREA
VISITOR CIRCULATION & SEATING AREA
DEMO AREA
ACCESS
A/V
RESTORE STAGE
10.96 CONCEPTUAL USE LAYOUT
MANZ
AUDITORIUM BUILDING
SCHEME
2
(ALT)
EXHIBITS
VISITOR ACCESS
POSSIBLE EXIT


EMERGENCY GENERATOR AREA
STAFF ACCESS/EXIT
STAFF TOILET & BREAK RM
ELECT RM
NEW TOILETS
STAFF OFFICE AREA
WATER TREATMENT EQUIP RM
STORAGE
STAFF ACCESS
EXIT
TO DEMONSTRATION AREAS
EXHIBITS
BOOK SALES
INFO DESK
NPS/DEC/AR
PARKING AREA
VISITOR ACCESS
VISITOR CIRCULATION & SEATING AREA
A/V
RESTORE STAGE
10/96 CONCEPTUAL USE LAYOUT
MANZ
AUDITORIUM BUILDING
SCHEME
3
(RPT)
EXHIBITS
POSSIBLE EXIT
POSSIBLE EXIT
POSSIBLE RECONSTRUCTION OF SOUTH WING (MAINT OPERATIONS, ADDITIONAL TOILETS, OFFICES, ETC IF NEEDED)



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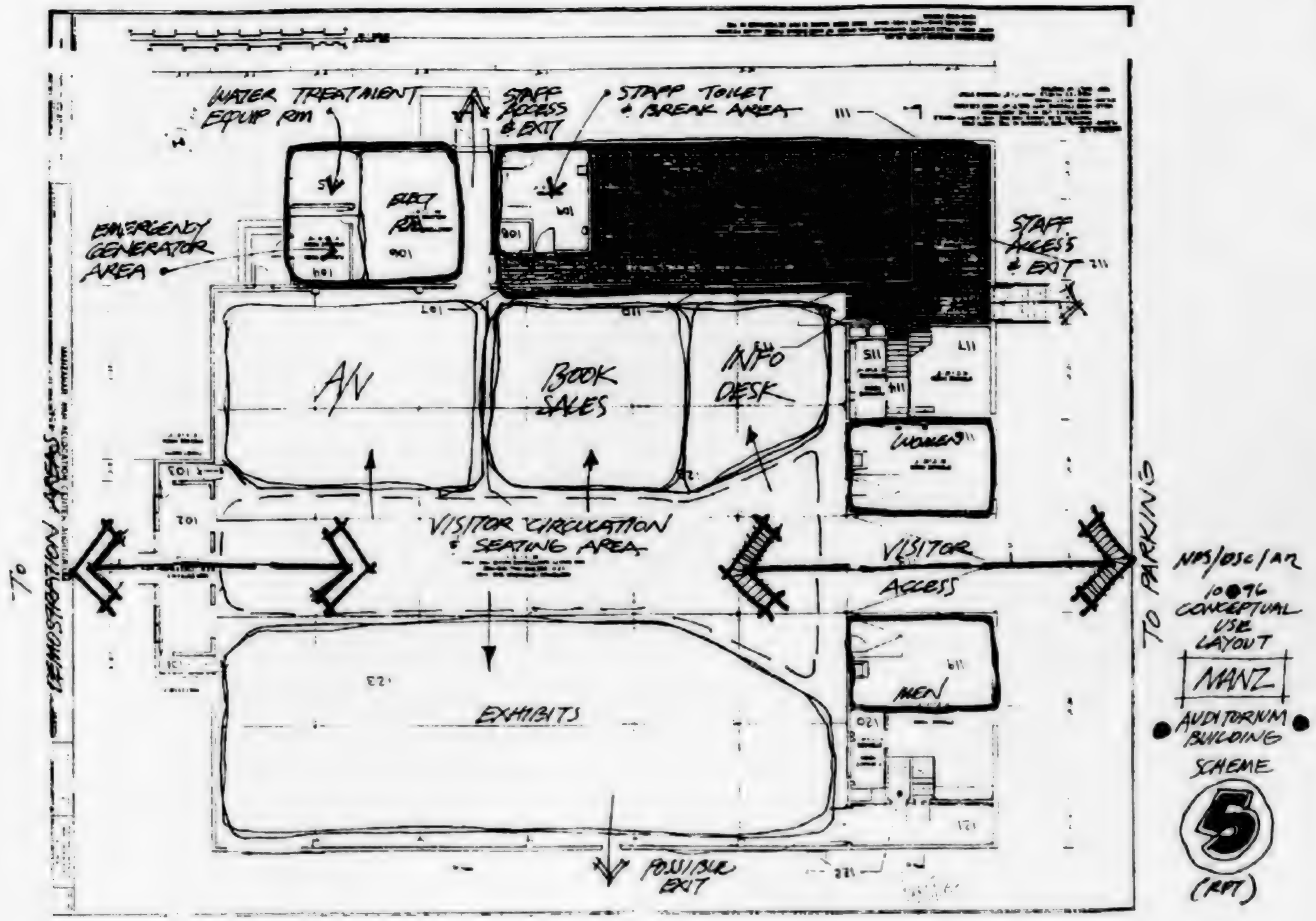

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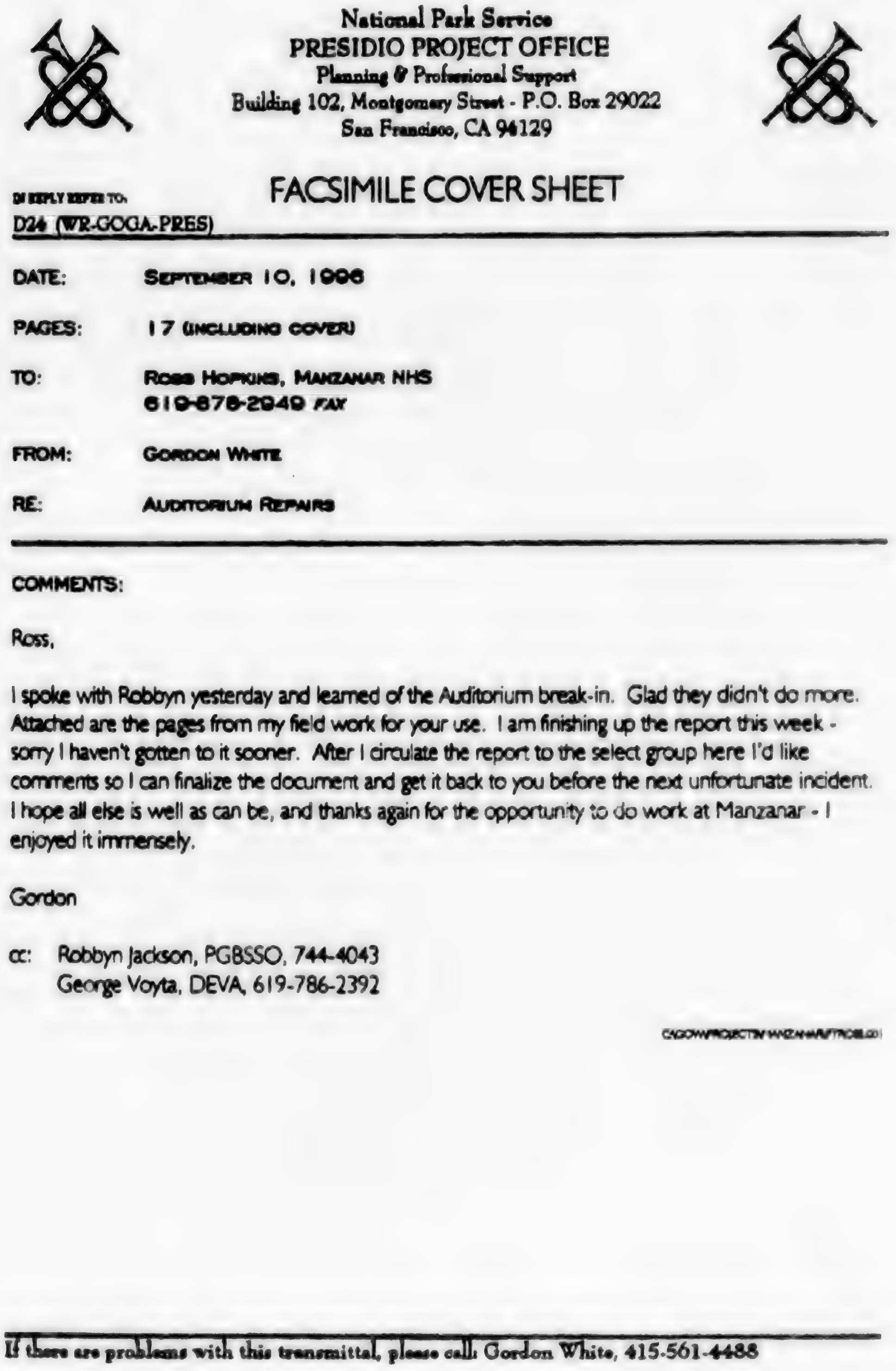
APPENDIX E: DOOR AND WINDOW ANALYSIS AND RECOMMENDATIONS

Door and window analysis and repair recommendations, prepared by Gordon White, National Park Service, Presidio Project Office, San Francisco, August 1996.



National Park Service
PRESIDIO PROJECT OFFICE
Planning & Professional Support
Building 102, Montgomery Street - P.O. Box 29022
San Francisco, CA 94129

IN REPLY REFER TO:
D24 (WR-GOGA-PRES)

FACSIMILE COVER SHEET

DATE: SEPTEMBER 10, 1996

PAGES: 17 (INCLUDING COVER)

TO: ROSS HOPKINS, MANZANAR NHS
619-878-2949 *FAX*

FROM: GORDON WHITE

RE: AUDITORIUM REPAIRS

COMMENTS:

Ross,

I spoke with Robbyn yesterday and learned of the Auditorium break-in. Glad they didn't do more. Attached are the pages from my field work for your use. I am finishing up the report this week - sorry I haven't gotten to it sooner. After I circulate the report to the select group here I'd like comments so I can finalize the document and get it back to you before the next unfortunate incident. I hope all else is well as can be, and thanks again for the opportunity to do work at Manzanar - I enjoyed it immensely.

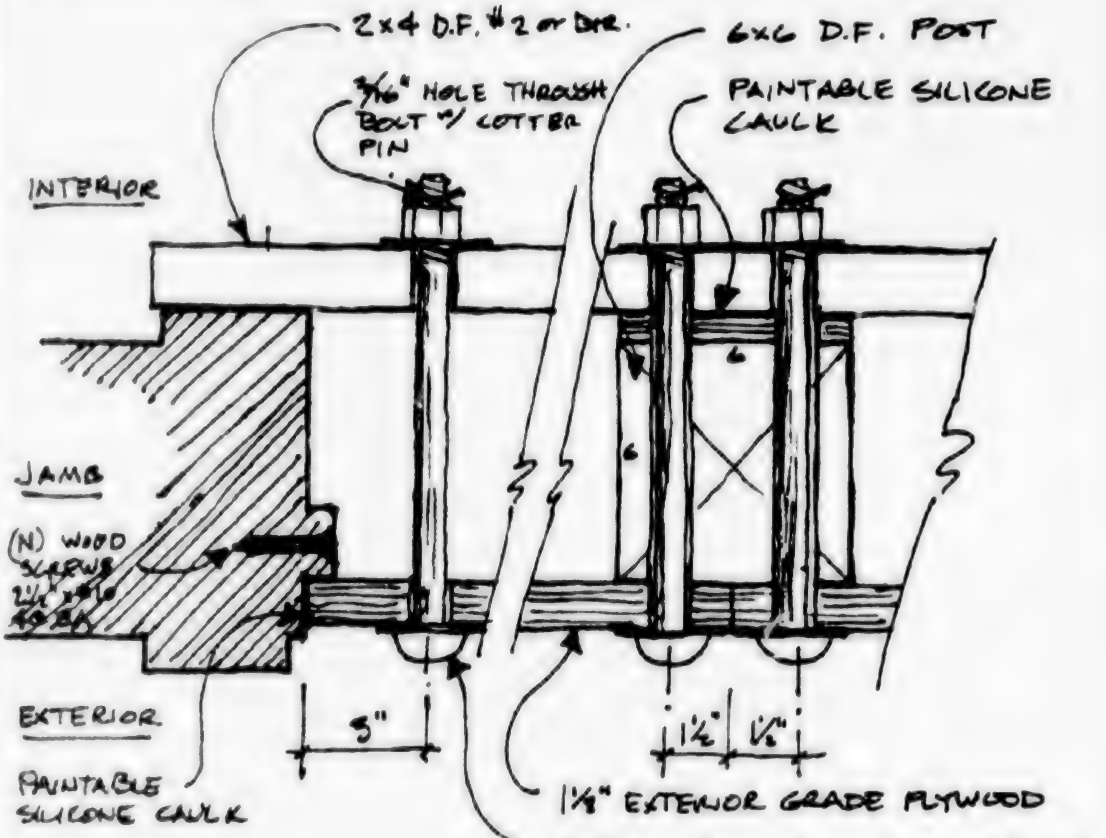
Gordon

cc: Robbyn Jackson, PGBSSO, 744-4043
George Voyta, DEVA, 619-786-2392

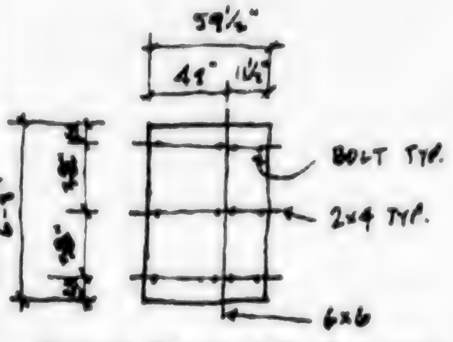
If there are problems with this transmittal, please call: Gordon White, 415-561-4488

Park MANZANAR NHS	**NATIONAL PARK SERVICE** **DENVER SERVICE CENTER**		Sheet
Area			of
Project	By GOW	Checked	Pkg.
Feature DOOR 1 CLOSURE	Date 8.20.96	Date	Account

- REMOVE (E) DOORS FOR STORAGE BY N.P.S.
- CLOSURE REQUIRES ONE FULL SHT. PLYWOOD & ONE PARTIAL SHT.
- JAMB DETAIL SHOWN – HEAD & THRESHOLD SIM.



3/4"ø x 10" CARRAIGE BOLT (ZINC) w/ WASHERS BOTH ENDS



FRAMING PLACEMENT DIAGRAM

NOTES: 12 BOLTS PLACED AS SHOWN @ LEFT. APPLY ONE COAT PRIMER & ONE COAT FINISH PAINT TO PLYWOOD EDGES & EXTERIOR FACE BEFORE INSTALLATION. APPLY SECOND COAT FINISH PAINT AFTER INSTALLATION

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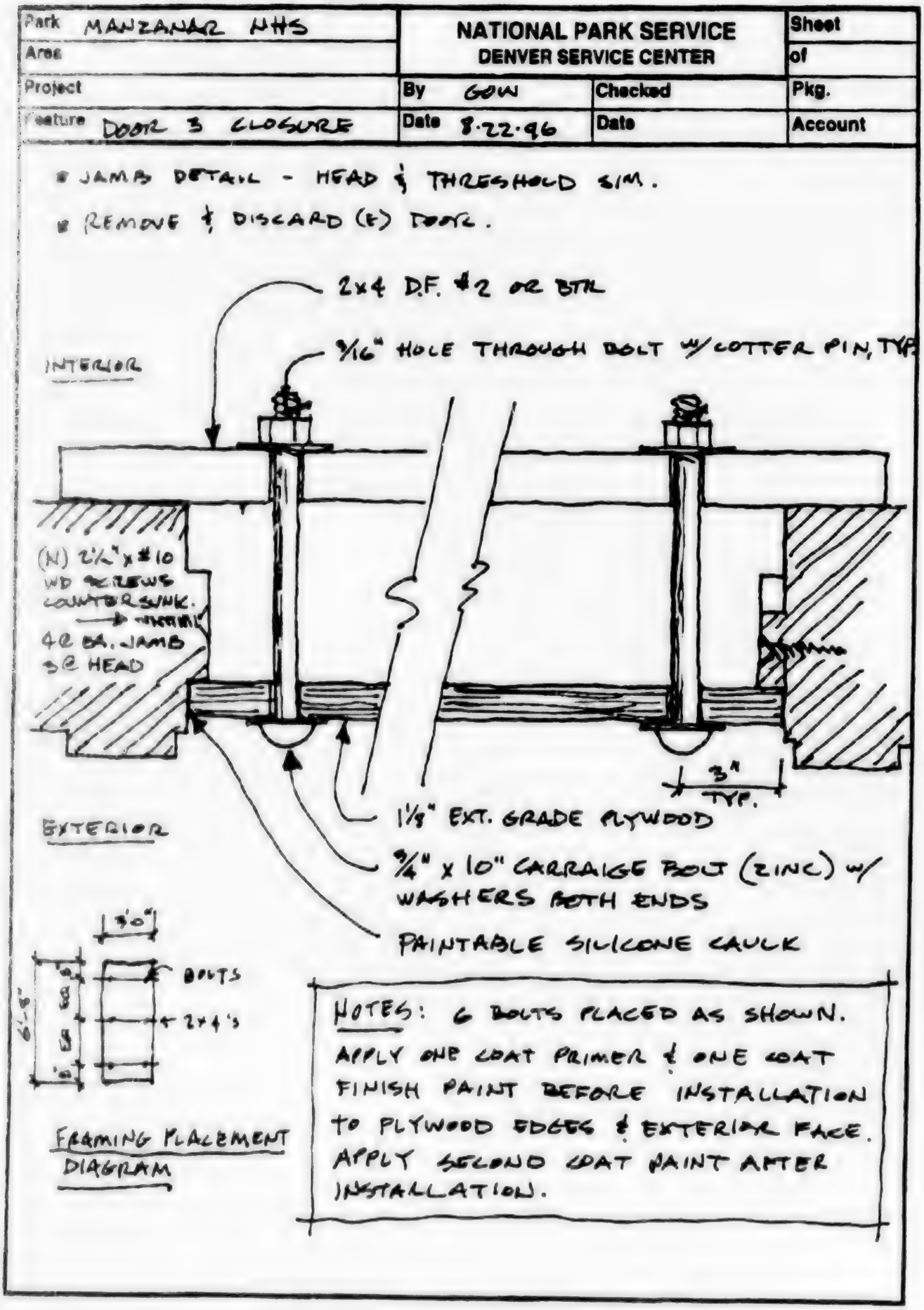
Park MANZANAR NHS	**NATIONAL PARK SERVICE** **DENVER SERVICE CENTER**		**Sheet**
Area			**of**
Project	**By** GOW	**Checked**	**Pkg.**
Feature DOOR SIZES	**Date** 8.20.96	**Date**	**Account**

DOOR #	W x H OPNG SIZE	W x H DOOR SIZE(S)	NOTES
1 A B	4'-11" x 6'-7 3/4" 59 1/2" x 79 1/2"	2'-5 3/8" x 6'-7 3/8" 2'-5 1/2" x 6'-7 3/4"	
2	3'-0" x 6'-8"	Same	
3	3'-0" x 6'-8"	Same	
4 A B	4'-11 1/2" x 6'-8"	29 1/2" x 6'-7 3/4 29 1/2" x 6'-7 3/4	~~unable to measure door widths.~~
5 A B	5'-0" x 6'-8"	29 13/16" x 6'-7 3/4 30 1/4" x 6'-7 3/4"	
6 metal clad w/ steel frame	2⁸ x 6⁷	Same	29 1/4" clear width ✯
7 WD. ROLLING	11'-8 3/4" x 11'-0 1/2"	N/A	± 2x6 FRAMING
8 ~~B~~ OUTER ~~ROLL UP~~ OPNG	14'-3" x 15'-1"	N/A	

✯ MUST BE WIDENED TO BE ACCESSIBLE ENTRANCE



Park MANZANAR NHS	NATIONAL PARK SERVICE DENVER SERVICE CENTER		Sheet
Area			of
Project	By GOW	Checked	Pkg.
Feature DOOR 3 CLOSURE	Date 8·22·96	Date	Account

* JAMB DETAIL - HEAD & THRESHOLD SIM.

* REMOVE & DISCARD (E) DOOR.

2x4 D.F. #2 OR BTR
9/16" HOLE THROUGH BOLT W/COTTER PIN, TYP.
INTERIOR
(N) 2½" x #10 WD SCREWS COUNTERSUNK.
4@ EA. JAMB
3@ HEAD
3" TYP.
EXTERIOR
1⅛" EXT. GRADE PLYWOOD
¾" x 10" CARRAIGE BOLT (ZINC) W/ WASHERS BOTH ENDS
PAINTABLE SILICONE CAULK
3'0"
BOLTS
2x4's
FRAMING PLACEMENT DIAGRAM

NOTES: 6 BOLTS PLACED AS SHOWN. APPLY ONE COAT PRIMER & ONE COAT FINISH PAINT BEFORE INSTALLATION TO PLYWOOD EDGES & EXTERIOR FACE. APPLY SECOND COAT PAINT AFTER INSTALLATION.

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Park MANZANAR NHS	**NATIONAL PARK SERVICE**		**Sheet**
Area	**DENVER SERVICE CENTER**		**of**
Project	**By** GOW	**Checked**	**Pkg.**
Feature DOOR 4 REPLACE.	**Date** 8.21.96	**Date**	**Account**

- REMOVE (E) ORIGINAL DOORS FOR STORAGE BY N.P.S. INSTALL (N) SOLID CORE FLUSH DOORS (1¾") IN (E) OPENING. PRIME & PAINT (2 COATS FINISH) BOTH FACES & ALL EDGES. EAST DOOR TO HAVE ASTRAGAL

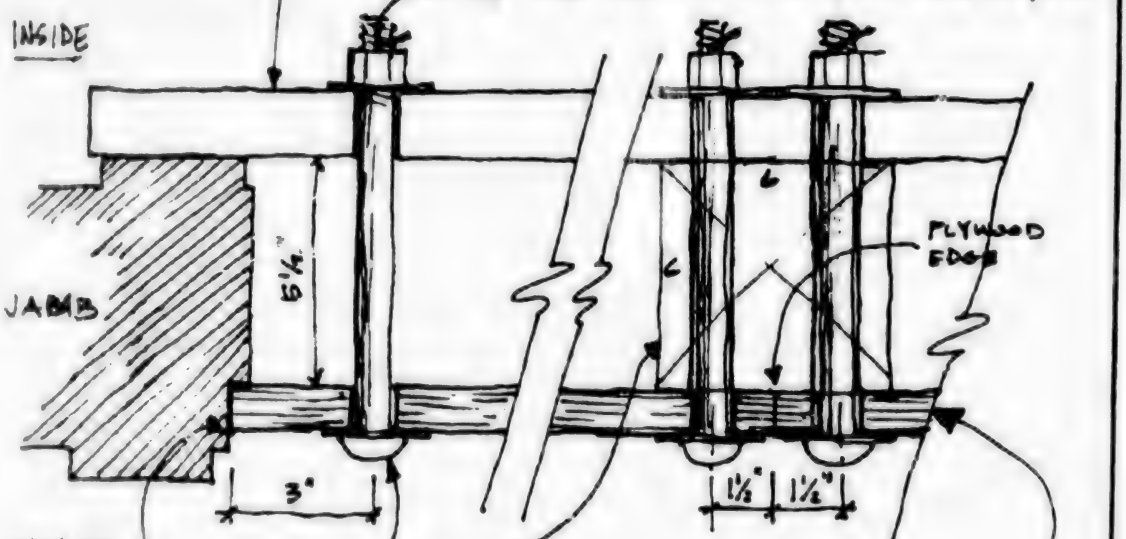
- HARDWARE:

Park MANZANAR NHS	**NATIONAL PARK SERVICE** **DENVER SERVICE CENTER**		Sheet
Area			of
Project	By GOW	Checked	Pkg.
Feature DOOR [illegible]5 CLOSURE	Date 8.22.96	Date	Account

- CLOSURE REQUIRES 1 FULL SHT. PLYWOOD & ONE PARTIAL SHT.
- JAMB DETAIL. HEAD & THRESHOLD SIM.
- REMOVE & RETAIN (E) DOORS FOR STORAGE BY N.P.S.

2x4 D.F. #2 OR BETTER, TYP.

5/16" HDG THROUGH BOLT w/ COTTER PIN, TYP.

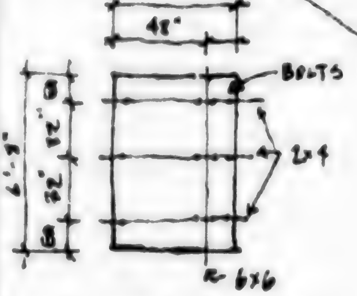


1 1/4" PLYWOOD, EXTERIOR GRADE

6x6 D.F. POST

3/4 x 10" CARRAIGE BOLT (ZINC) w/ WASHERS BOTH ENDS.

PAINTABLE SILICONE CAULK



FRAMING PLACEMENT DIAGRAM

NOTES: 12 BOLTS PLACED AS SHOWN @ LEFT. APPLY 1 COAT PRIMER & ONE COAT FINISH PAINT TO PLYWOOD EDGES & EXTERIOR FACE BEFORE INSTALLATION. APPLY SECOND COAT FINISH PAINT AFTER INSTALLATION.

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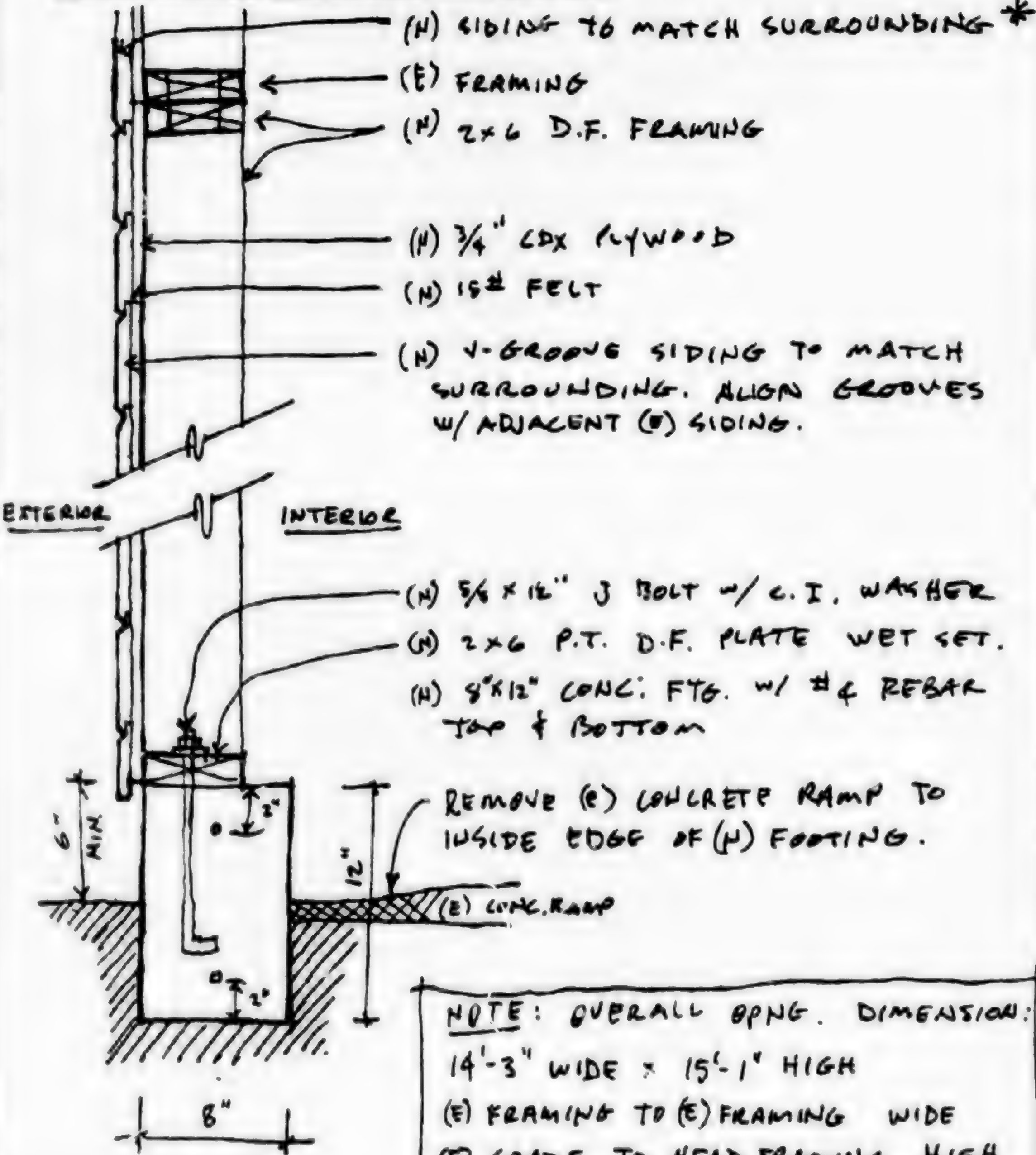
Park MANZANAR NHS	**NATIONAL PARK SERVICE** **DENVER SERVICE CENTER**		Sheet
Area			of
Project	By GOW	Checked	Pkg.
Feature DOOR 7 - ROLL UP	Date 8.22.96	Date	Account

- OPENING SIZE: 11'-8¾" WIDE x 11'-0" HIGH
- EXPOSURE: OPENING FACES SOUTH
- WIND LOAD: LOAD CLASS C - 70 MPH
- CONSTRUCTION: WOOD FRAMING - INSTALL DOOR ON INTERIOR OF OPENING.
- DOOR SPECS: 20 GUAGE ROLLING STEEL SERVICE DOOR w/ FLAT SLATS; WEATHERSTRIPPING (INCLUDING HOOD BAFFLE); END LOCKS.
- MOTOR: GEAR DRIVE w/ MOUNTING BRACKET BUILT INTO GUIDES OR HEADPLATE.
- CONTROLS: EXTERIOR KEY OPERATED SWITCH; INTERIOR PUSH-BUTTON OPERATOR, BOTH ADJACENT TO DOOR; SAFETIES (AUTO OFF @ FULL OPEN & FULL CLOSE)
- WARRANTY: 3 YR. ON PRODUCT & INSTALLATION
- FINISH: PRIME COAT BOTH SIDES - WHITE
- ACCEPTABLE MANUFACTURERS: NORTH AMERICAN (FIRST CHOICE), WINDSOR, ATLAS DOOR, SOUTHWESTERN.
- NOTES: INSTALLER TO DO ALL FRAMING REQ'D FOR INSTALLATION. SUBMIT SHOP DRAWINGS OF MOUNTING DETAILS TO N.P.S. FOR REVIEW & APPROVAL.
- EXISTING CONDITIONS: PLUMBING & ELECTRICAL MUST BE MOVED BEFORE INSTALLATION. THIS WORK BY N.P.S.

Park MANZANAR NHS	NATIONAL PARK SERVICE DENVER SERVICE CENTER		Sheet
Area			of
Project	By GBW	Checked	Pkg.
Feature (N) FRAMING @ LR DOOR	Date 8.21.96	Date	Account

PREFERRED ALTERNATIVE


(N) SIDING TO MATCH SURROUNDING *
(E) FRAMING
(N) 2×6 D.F. FRAMING
(N) 3/4" CDX PLYWOOD
(N) 15# FELT
(N) V-GROOVE SIDING TO MATCH SURROUNDING. ALIGN GROOVES W/ ADJACENT (E) SIDING.
EXTERIOR
INTERIOR
(N) 5/8 × 12" J BOLT W/ C.I. WASHER
(N) 2×6 P.T. D.F. PLATE WET SET.
(N) 8"×12" CONC. FTG. W/ #4 REBAR TOP & BOTTOM
REMOVE (E) CONCRETE RAMP TO INSIDE EDGE OF (N) FOOTING.
(E) CONC. RAMP
6" MIN
2"
12"
2"
8"

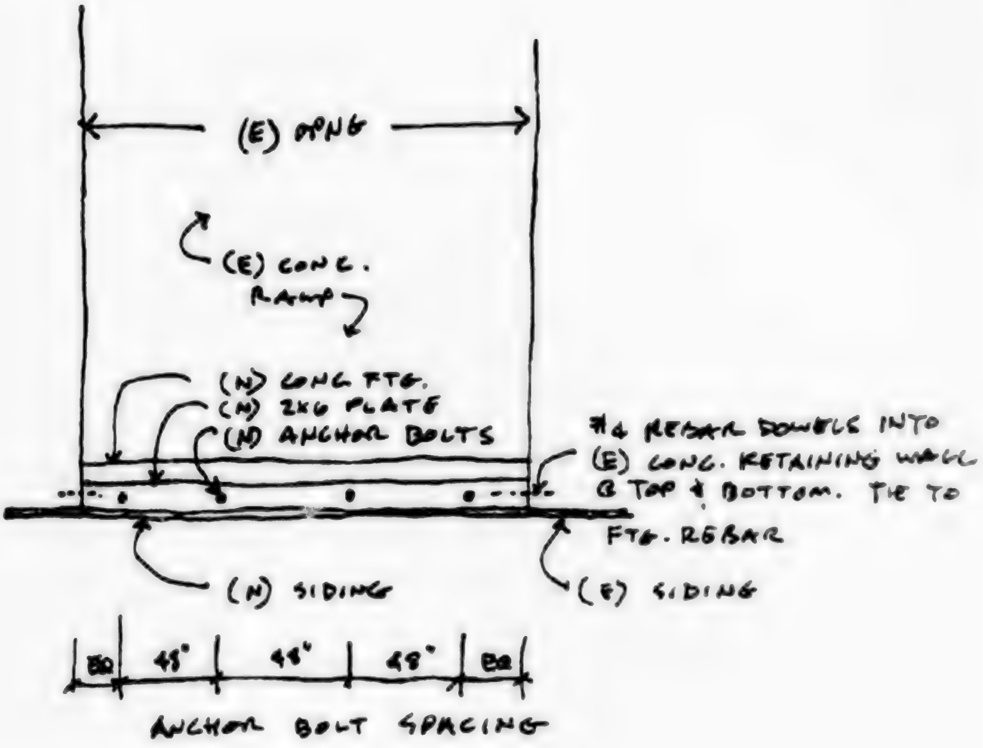
NOTE: OVERALL OPNG. DIMENSION:
14'-3" WIDE × 15'-1" HIGH
(E) FRAMING TO (E) FRAMING WIDE
(E) GRADE TO HEAD FRAMING HIGH

* REMOVE & REPLACE FIRST ROW SIDING ABOVE OPNG.

Park MANZANAR NHS	**NATIONAL PARK SERVICE** **DENVER SERVICE CENTER**		**Sheet**
Area			**of**
Project	**By** GOW	**Checked**	**Pkg.**
Feature LG. OPNG CLOSURE	**Date** 9.21.96	**Date**	**Account**

PLAN VIEW INFO

PREFERRED ALT.



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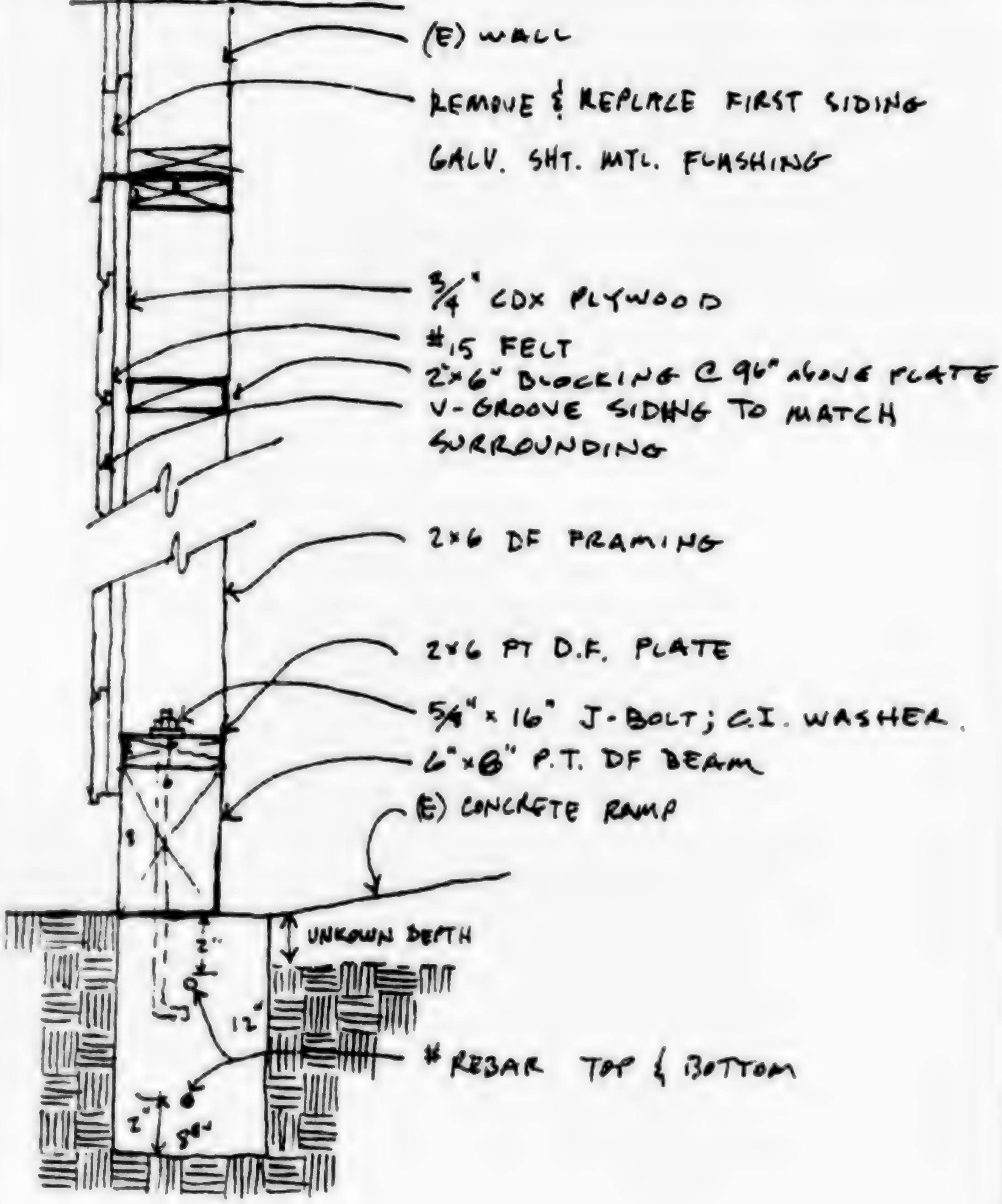
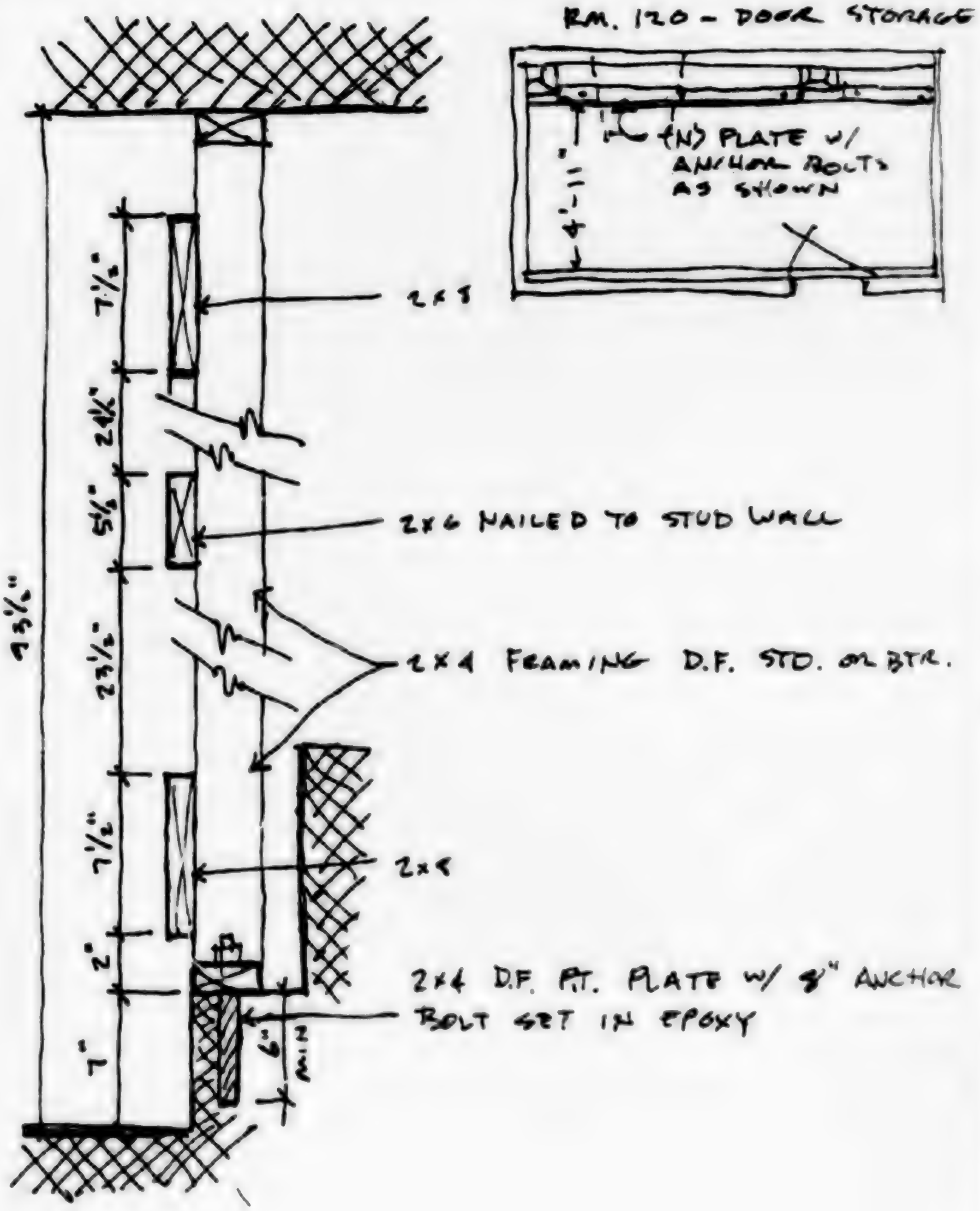
Park MANZANAR NHS	NATIONAL PARK SERVICE		Sheet
Area	DENVER SERVICE CENTER		of
Project	By GOW	Checked	Pkg.
Feature (E) OPNG CLOSURE	Date 8·21·96	Date	Account

ALTERNATIVE 2



Park MANZANAR	**NATIONAL PARK SERVICE** **DENVER SERVICE CENTER**		**Sheet**
Area			**of**
Project	**By** GOW	**Checked**	**Pkg.**
Feature DOOR STORAGE RACK	**Date** 8-22-96	**Date**	**Account**



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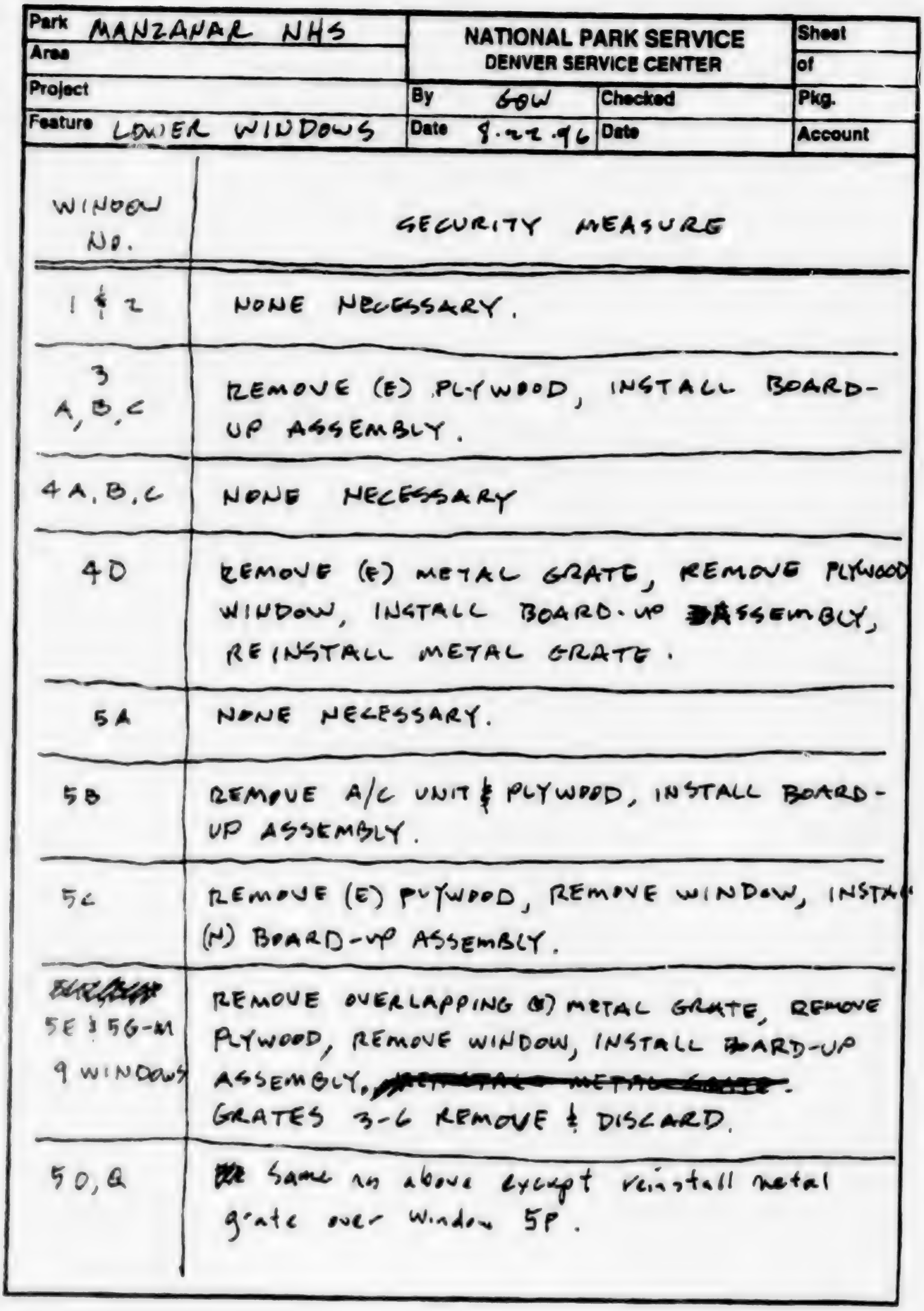

Park MANZANAR NHS	NATIONAL PARK SERVICE		Sheet
Area	DENVER SERVICE CENTER		of
Project	By GOW	Checked	Pkg.
Feature LOWER WINDOWS	Date 8.22.96	Date	Account

WINDOW NO.	SECURITY MEASURE
1 & 2	NONE NECESSARY.
3 A, B, C	REMOVE (E) PLYWOOD, INSTALL BOARD-UP ASSEMBLY.
4 A, B, C	NONE NECESSARY
4D	REMOVE (E) METAL GRATE, REMOVE PLYWOOD WINDOW, INSTALL BOARD-UP ASSEMBLY, REINSTALL METAL GRATE.
5A	NONE NECESSARY.
5B	REMOVE A/C UNIT & PLYWOOD, INSTALL BOARD-UP ASSEMBLY.
5C	REMOVE (E) PLYWOOD, REMOVE WINDOW, INSTA (N) BOARD-UP ASSEMBLY.
[illegible] 5E & 5G-M 9 WINDOWS	REMOVE OVERLAPPING (E) METAL GRATE, REMOVE PLYWOOD, REMOVE WINDOW, INSTALL BOARD-UP ASSEMBLY, ~~REINSTALL METAL GRATE~~. GRATES 3-6 REMOVE & DISCARD.
5 O, Q	Same as above except reinstall metal grate over window 5P.

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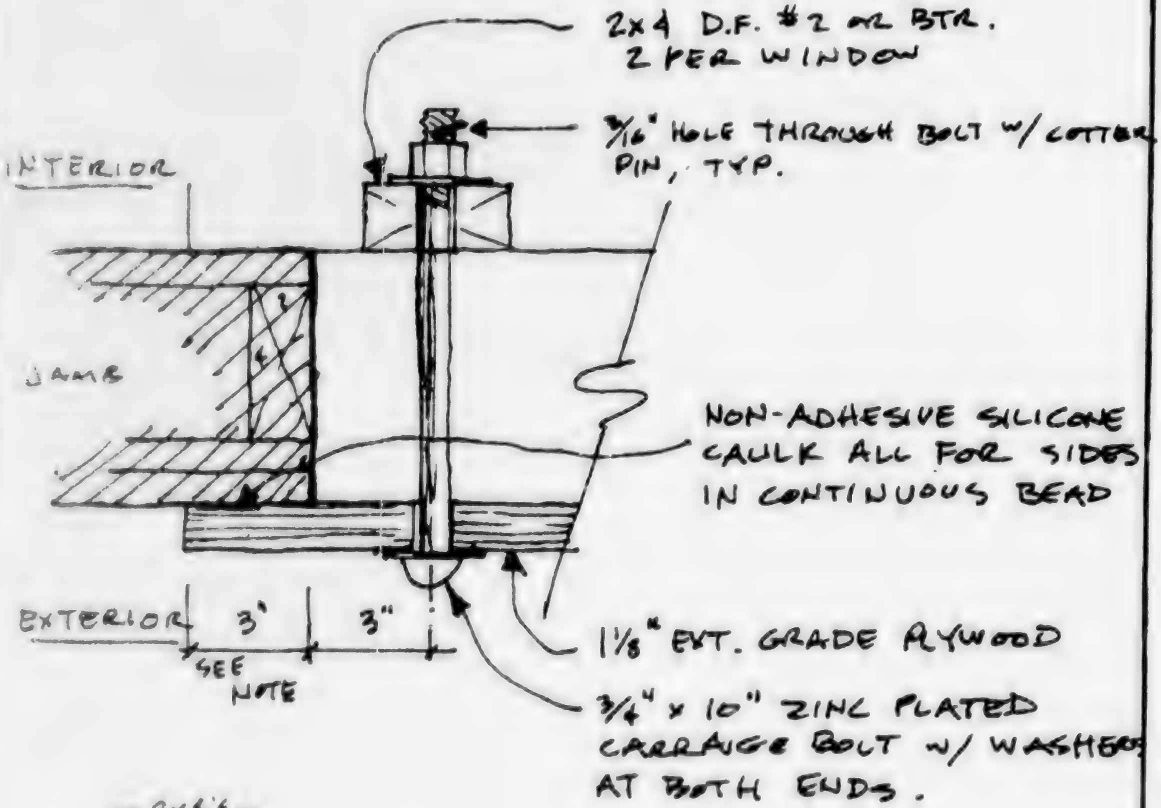
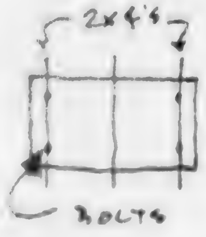
Park MANZANAR NHS	**NATIONAL PARK SERVICE** **DENVER SERVICE CENTER**		**Sheet**
Area			**of**
Project	**By** GOW	**Checked**	**Pkg.**
Feature LOWER WINDOWS	**Date** 8.22.96	**Date**	**Account**

WINDOW NO.	SECURITY MEASURE
6 & 7	REMOVE (E) PLYWOOD, INSTALL BOARD-UP ASSEMBLY
8 & 9	NONE NECESSARY.
10 & 11	NONE NECESSARY.
12 & 13	SEE ATTACHED PAGES ON UPPER WINDOWS.

Park MANZANAR NHS	NATIONAL PARK SERVICE DENVER SERVICE CENTER		Sheet
Area			of
Project	By GJW	Checked	Pkg.
Feature LOWER WINDOW BOARD-UP	Date 8-22 96	Date	Account

■ JAMB DETAIL – HEAD & SILL SIM.


2x4 D.F. #2 OR BTR.
2 PER WINDOW
5/16" HOLE THROUGH BOLT W/ COTTER PIN, TYP.
INTERIOR
JAMB
NON-ADHESIVE SILICONE CAULK ALL FOR SIDES IN CONTINUOUS BEAD
EXTERIOR
3"
3"
SEE NOTE
1 1/8" EXT. GRADE PLYWOOD
3/4" x 10" ZINC PLATED CARRIAGE BOLT W/ WASHERS AT BOTH ENDS.



FRAMING PLACEMENT DIAGRAM

NOTES: 4 BOLTS PER WINDOW PLACED AS SHOWN. APPLY 1 COAT PRIMER AND ONE COAT FINISH PAINT TO PLYWOOD EDGES & EXTERIOR FACE BEFORE INSTALLATION. APPLY SECOND FINISH COAT PAINT AFTER INSTALLATION.

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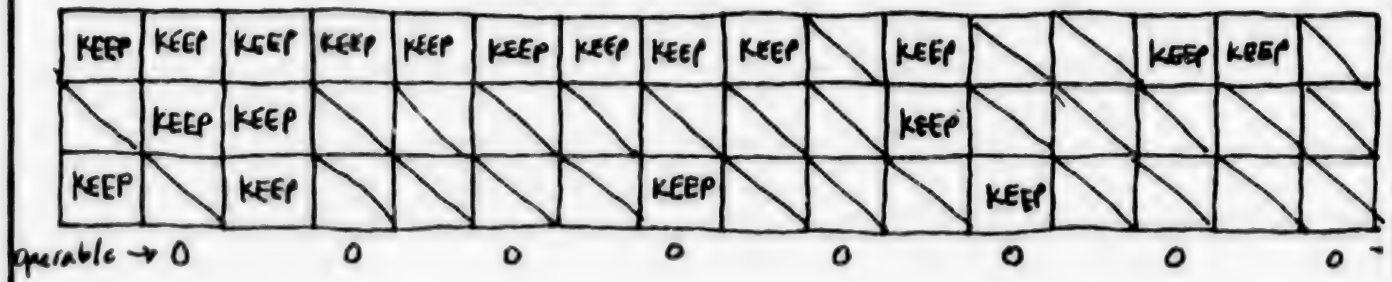
UPPER WINDOWS

NORTH ELEVATION



- KEEP 19 WINDOWS – REMOVE, REPAIR, REGLAZE w/ ORIGINAL GLAZING, & PAINT. SALVAGE GLAZING FROM OTHER WINDOWS.
- DISCARD 28 WINDOWS - REPLACE w/ WINDOWS TO MATCH ORIGINALS. USE ORIGINAL GLAZING EXCEPT WHERE BROKEN.
- KEEP TWO OPERABLE WINDOWS TO REMAIN IN SAME LOCATION. LOCATE OTHER SIX NEW OPERABLE WINDOWS IN PATTER SHOWN ABOVE (OPERABLE WINDOWS NOTED WITH "0").
- CONSTRUCT (N) WINDOWS USING JOINERY TO MATCH ORIGINALS.
- USE LINSEED OIL GLAZING PUTTY. PAINT w/ UV RESISTANT PAINT
- PRIME w/ WEATHERED WOOD PRIMER
- AFFIX ALL FIXED WINDOWS TO FRAME w/ BRASS SCREWS, COUNTERSUNK.

Park MANZANAR NHS
Area
Project
Feature UPPER WINDOWS NORTH

NATIONAL PARK SERVICE
DENVER SERVICE CENTER

By GOW
Date 8-22-96
Checked
Date
Sheet
of
Pkg.
Account

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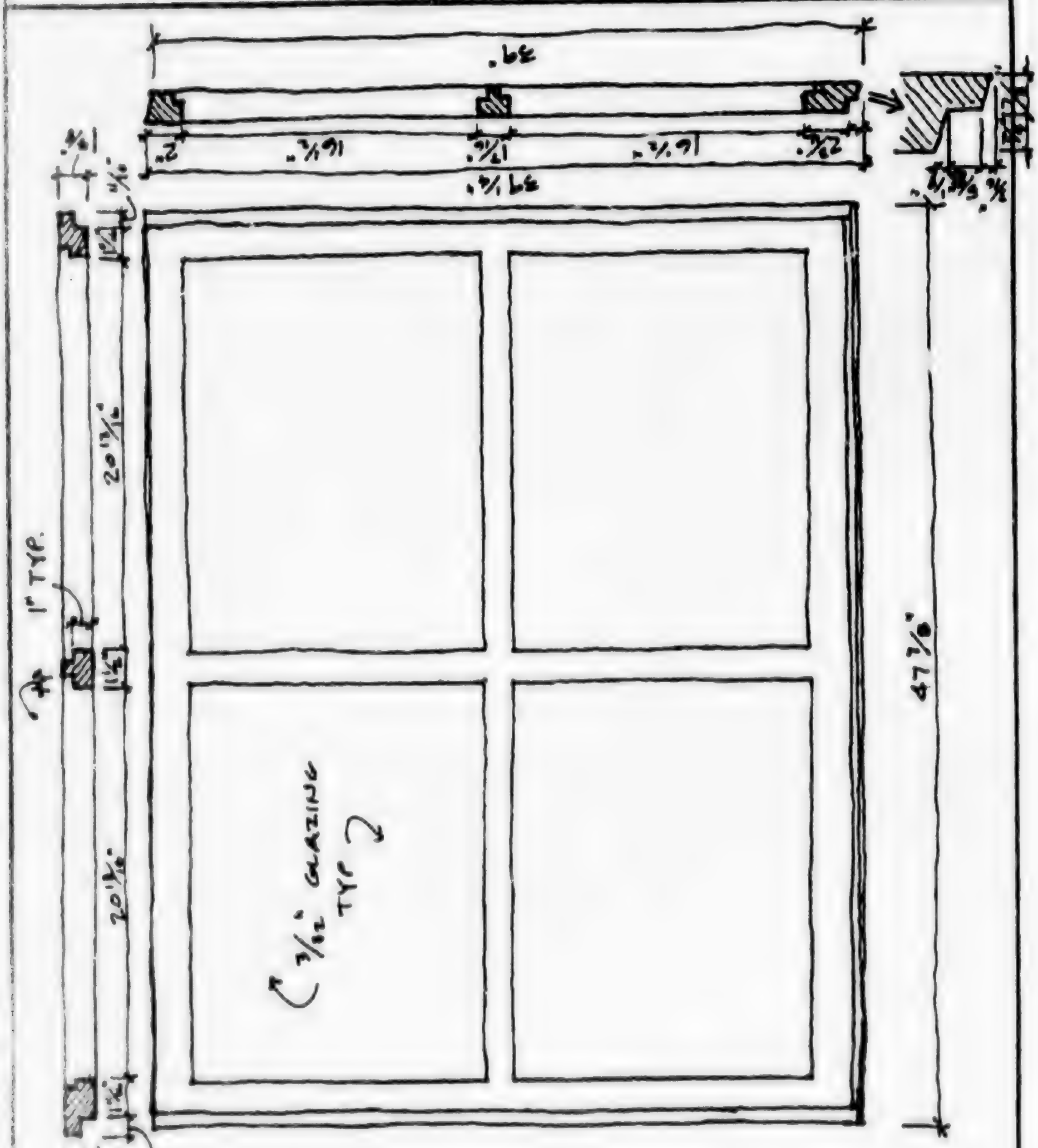
Park MANZANAR NHS	**NATIONAL PARK SERVICE** **DENVER SERVICE CENTER**	Sheet
Area		of
Project	By GOW	Checked	Pkg.
Feature UPPER WD. WINDOW	Date 8.21.96	Date	Account



DIMENSIONS TAKEN FROM W8 @ PROJECTION ROOM.
OTHER WINDOWS HAVE SAME DIMENSIONS.

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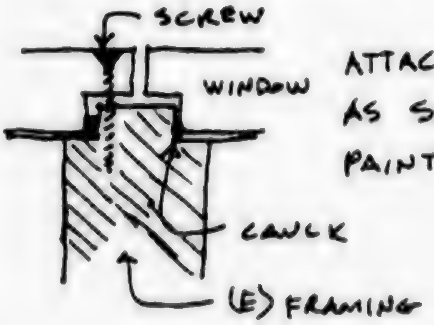
Park MANZANAR NHS	**NATIONAL PARK SERVICE** **DENVER SERVICE CENTER**			**Sheet**
Area				**of**
Project	**By** GOW		**Checked**	**Pkg.**
Feature UPPER WINDOWS	**Date** 8.22.96		**Date**	**Account**

- SET FIXED WINDOWS IN NON-ADHESIVE SILICONE CAULK, CONTINUOUS @ ALL FOUR EDGES!



ATTACH WINDOW W/ BRASS RND. SCREW AS SHOWN. COUNTERSINK, FILL & PAINT OVER.

- REMOVE & REPLACE ALL UPPER WINDOWS ON SOUTH ELEVATION. (N) WINDOWS TO MATCH ORIGINALS. IN DIMENSION & JOINERY. RETAIN UNBROKEN GLAZING FOR USE IN [redacted] NORTH WINDOWS. & STORAGE BY N.P.S.

APPENDIX F: FURNACE FLUE AND VENT DETAILS

Details of furnace flue enclosures and vent details in Projection Room and furnace rooms originally constructed in part with asbestos materials, recorded by George Voyta, August 1996, before asbestos abatement work

"MANZANAR AUDITORIUM"

ASBESTOS DETAILS

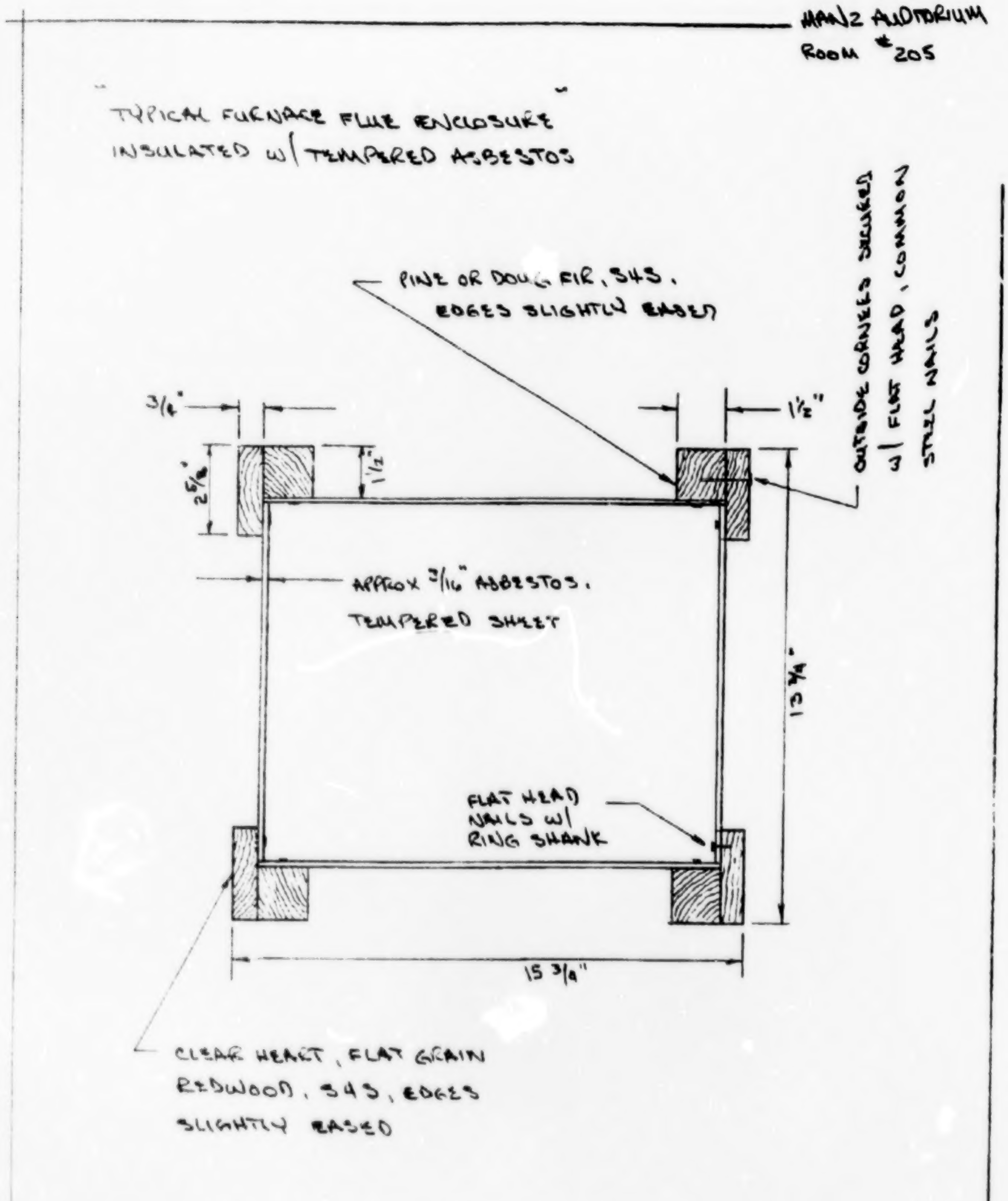
THE FOLLOWING SKETCHES OF ASBESTOS DETAILS WERE DONE SHORTLY BEFORE THE ASBESTOS REMOVAL CONTRACT TOOK PLACE. THIS INFORMATION WILL BE USEFUL IN THE EVENT THESE FEATURES ARE TO BE RECREATED IN THE FUTURE, USING SOME SIMILIAL APPEARING MATERIAL.

AUGUST 2ND. 96
MANZ AUDITOR
PAGE #1

AUDITORIUM . MANZANAR
ROOM #205 FURNACE FLUE DETAIL

DURING NEXT MONTHS SCHEDULED "ASBESTOS REMOVAL" AT MANZ , A FEW BUILDING DETAILS MAY BE LOST. AMONG THESE IS THE ASBESTOS INSULATED , FLUE COVER. IT IS ASSEMBLED IN SUCH A MANNER , THAT ONCE THE PRESSED ASBESTOS PANELS ARE REMOVED . . . THE FOUR TRIM BOARD CORNERS WILL NOT REMAIN IN PLACE. THIS IS ASSUMING THEY SURVIVE THE PROCESS OF ASBESTOS REMOVAL.

THE ATTACHED SKETCH REPRESENTS THE TYPICAL FLUE ENCLOSURE SYSTEM USED THROUGHOUT THE BUILDING. I BELIEVE SOME ENCLOSURES WERE PAINTED , WHILE OTHERS WERE LEFT BARE WOOD.


MANZ AUDITORIUM
ROOM #205
"TYPICAL FURNACE FLUE ENCLOSURE
INSULATED W/ TEMPERED ASBESTOS"
PINE OR DOUG FIR, S4S.
EDGES SLIGHTLY EASED
OUTSIDE CORNERS SECURED
W/ FLAT HEAD, COMMON
STEEL NAILS
3/4"
1½"
2 5/8"
1½"
APPROX 3/16" ASBESTOS.
TEMPERED SHEET
13 3/4"
FLAT HEAD
NAILS W/
RING SHANK
15 3/4"
CLEAR HEART, FLAT GRAIN
REDWOOD, S4S, EDGES
SLIGHTLY EASED
AUG 11, 1990
3"=1'
"ASBESTOS DETAIL SECTION"
DRWN. GEO. VOYTA

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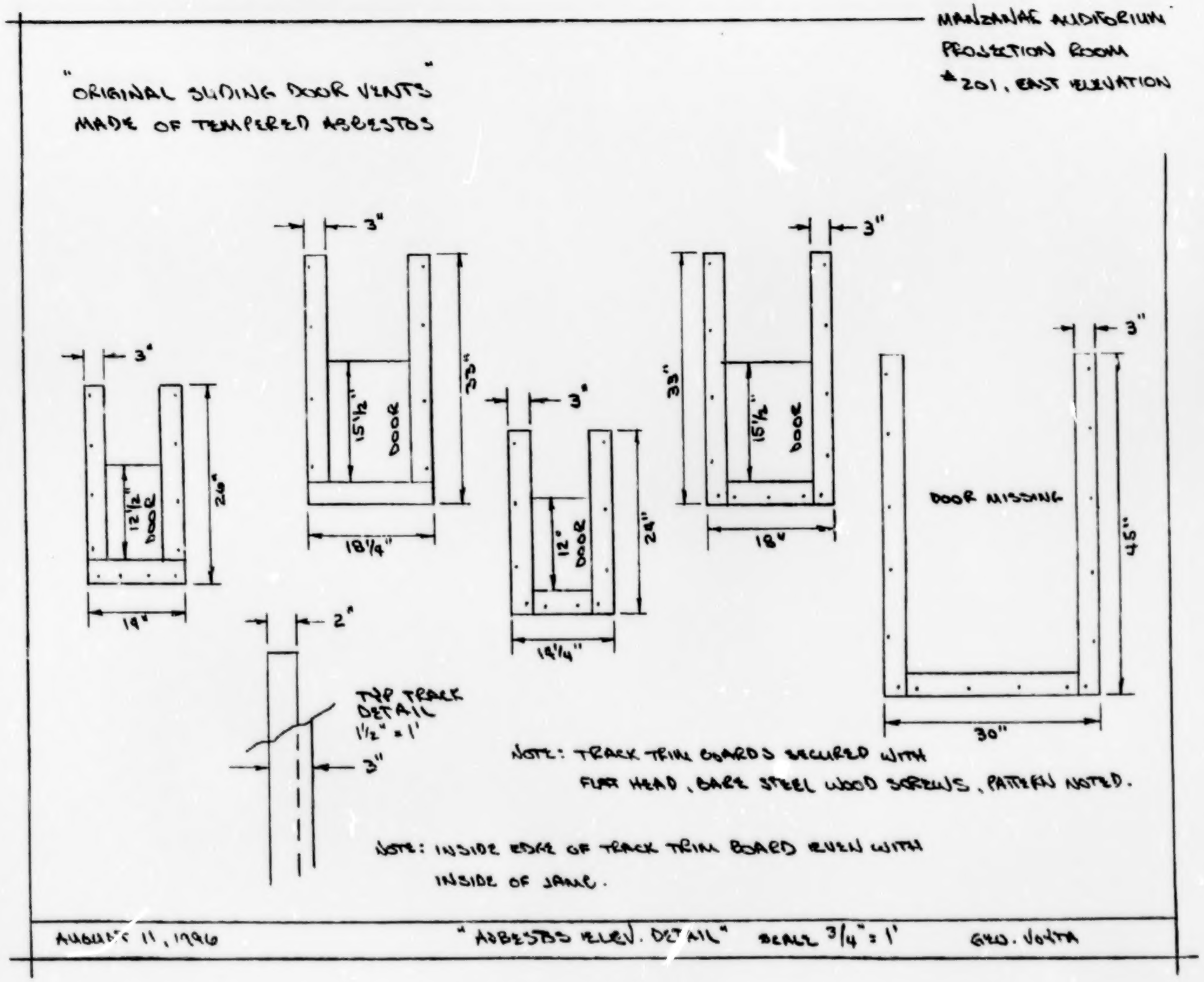
MANZANAR AUDITORIUM
PROJECTION ROOM
#201, EAST ELEVATION
"ORIGINAL SLIDING DOOR VENTS"
MADE OF TEMPERED ASBESTOS
3"
12½" DOOR
26"
19"
3"
15½" DOOR
33"
18¼"
3"
12" DOOR
24"
18¼"
3"
33"
15½" DOOR
18"
3"
DOOR MISSING
45"
30"
2"
TYP TRACK DETAIL 1½" = 1'
3"
NOTE: TRACK TRIM BOARDS SECURED WITH FLAT HEAD, BARE STEEL WOOD SCREWS, PATTERN NOTED.
NOTE: INSIDE EDGE OF TRACK TRIM BOARD EVEN WITH INSIDE OF JAMB.
AUGUST 11, 1996
"ASBESTOS ELEV. DETAIL"
SCALE ¾" = 1'
GEO. VOTTA

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